

# THE IRON AGE

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## Deep-Hole Drilling in Large Lathe

Success in Drilling Printing Machine Rolls Attributed to  
Boring Bar—Machining of Rolls Described—Special  
Milling Attachments Developed

THE problem of drilling parallel deep holes has been satisfactorily worked out at the plant of Walter Scott & Co., Plainfield, N. J., manufacturers of printing machinery, in the drilling of forged steel

around the bar at the fast end for admission of lubricant.

The design and construction of the bar, the end of which is shown in Fig. 2, are of interest. Two  $\frac{1}{4}$ -in.

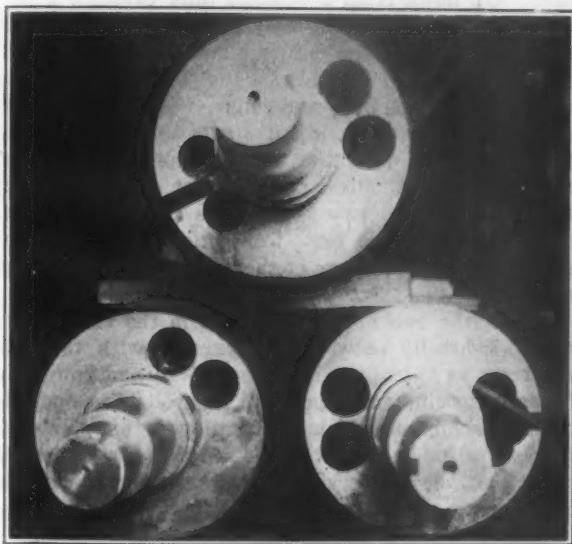


Fig. 1. (Above) Rolls of 0.40 Carbon Steel Are Drilled To Depth of 45 In. The lower right hand roll shows one side finished, two holes having been drilled, a slot planed, and the remaining material between holes removed with an end mill

Fig. 2. (At Upper Right) A Special Boring Bar With Two Oil Tubes and Chip Clearance Is Used

Fig. 3. After Drilling and Planing Operations, the End Mill With Guide Shoe Is Used to Remove Metal Between Holes



rolls 80 in. long, and ranging from  $13\frac{1}{4}$  in. to  $16\frac{1}{4}$  in. in diameter.

The rolls, an end view of which may be seen in Fig. 1, are of 0.40 per cent carbon steel. Drilling is of  $2\frac{1}{2}$  in. from the solid at the rate of  $\frac{1}{4}$  in. per min. and the two holes must register parallel within  $\frac{3}{32}$  in. at a depth of 45 in., as the finished rolls are required to be in balance. The work is held in the carriage of a large lathe in a V-block cradle, and fed against the boring bar. The latter is held in the lathe spindle with a draw bar, and has a stuffing box at each side of a groove

holes lead from the groove through the bar to the cutter end and serve to deliver lubricant under pressure, introducing it immediately behind the cutter. These oil channels are produced from slots milled lengthwise of the bar after it has been rough turned. Steel cover plates are then set into the bar over the slots and oxy-acetylene welded in place, after which the bar is finish turned to  $\frac{1}{64}$  in. under size, allowing for lubricating clearance. Next, two chip clearance slots are milled in the bar.

The cutter set in the end of the bar is full diameter

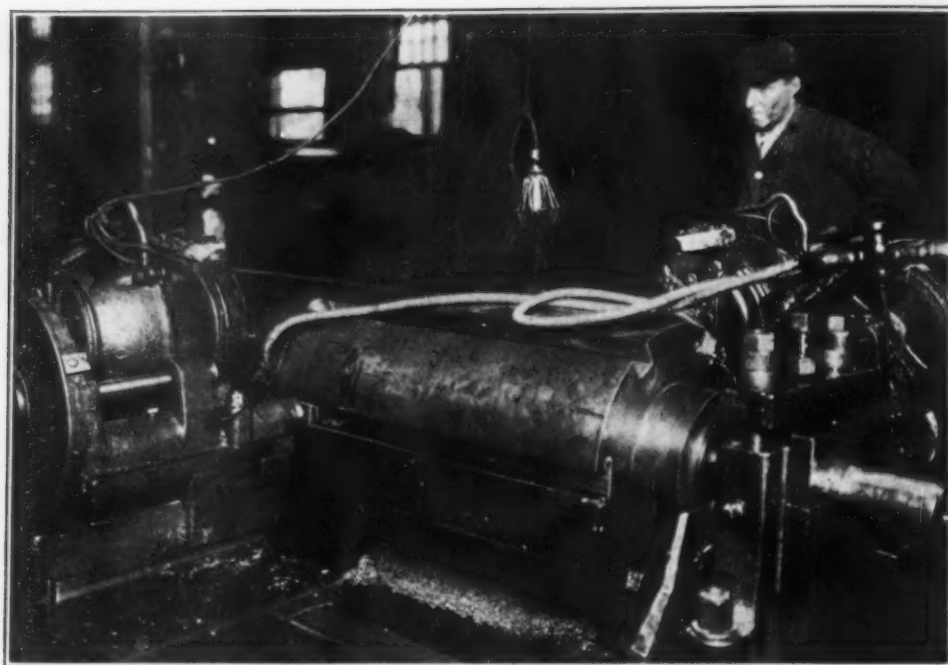


Fig. 4.

An Engine Lathe Has Been Equipped With Two Milling Attachments On Carriages to Mill T-Slots in Opposite End of Roll

and is ground with a special undercut at the center to produce a thin point. It is pinned in place. The back of the cutter is supported by the bar to within  $\frac{5}{32}$  in. of the edge. The bar is cut back  $\frac{5}{8}$  in. from the top or cutting edge of the cutter to allow room for chips to feed into the chip clearance slot. The cutter edge is nicked to break chips.

A special bracket for setting the bar is mounted on the lathe carriage. This bracket was bored in the lathe while set close to the headstock. The bracket with a bushing holds the end of the bar parallel with the lathe bed while the hole is being started, after which the guide bushing is removed.

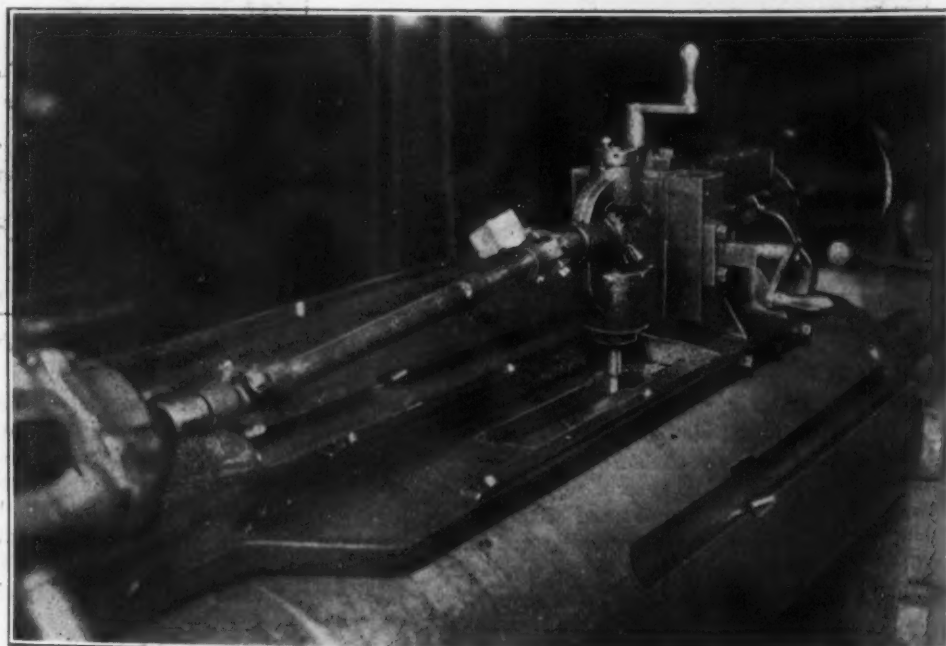
Oil pressure for removing chips and lubricating the bar is secured from a pump designed and built by the company. This pump is 4 in. outside diameter and has a chamber 3 in. in diameter by 2 in. In the chamber revolves a collar attached to the 1 in. pump shaft. Transversely through this collar is a slot in which the pump vanes or blades work. The shaft is set in the pump body in an eccentric position leaving  $\frac{1}{2}$  in. space as the greatest distance between the chamber interior and the periphery of the collar. The blades are L-

shaped and when assembled with springs between are placed in the slot in the collar. The springs serve to hold the blades tight against the chamber diameter thereby providing against leakage under driving pressure. Oil flows from a storage tank through a  $\frac{3}{4}$ -in. intake pipe to the pump and fills the chamber behind one blade before the other blade passes the intake orifice, which is placed close to the position of minimum clearance between body and collar. As the second blade passes the intake opening it starts to force the oil in front of it into a smaller space. The outlet is placed at the point of smallest area on that side of the pump body and leads to two  $\frac{5}{8}$ -in. pipes for delivery to the groove in the boring bar. The action serves to deliver oil under heavy pressure at the rate of 10 to 15 gal. per min.

After the two holes are drilled in the roll a slot is planed centrally between and parallel with the holes, as shown in the upper roll, Fig. 1. In addition to fulfilling a specific function when the roll is in operation on the machine on which it is employed, this planed slot is used to guide a pilot block for the next machining operation, the block sliding along under a clamping

Fig. 5.

A Relieved Area To Permit Removal of Dogs From T-Slots Is Produced By An Air Operated Milling Attachment



shoe. The piloting is to steady the end of a boring bar similar to that previously described, but which carries an end mill, as shown in Fig. 3. With this end mill the metal left between the two drilled holes is removed. Near the end of the operation, the pilot is taken out and a guide bushing inserted to finish. Oiling in this operation is through the slot in the roll.

The roll is next transferred to a planer which machines six slots 30 in. long equally spaced around the roll at the end opposite the slots just described. Following this the six slots are undercut for T-slots two at a time, as shown in Fig. 4 in a double carriage lathe. The roll does not turn in the lathe but is placed in a

keyways. The cutter is adjustable vertically for depth of cut. This attachment permits the key slots to be milled and squared at the closed end in one setting of the work.

At this plant the handling of large castings which require drilling is simplified and the removal of chips facilitated by the arrangement illustrated in Fig. 7. A special iron platform has been built on which is mounted a radial drill, as shown. Large work instead of having to be lowered into a pit is bolted to the side of the platform within reach of the radial drill; the chips fall to the floor, being thereby much more easily removed than were they in a pit.

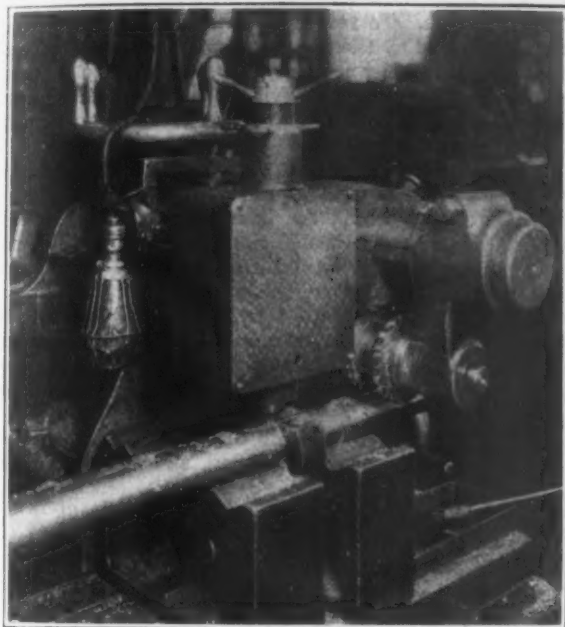


Fig. 6.—A Combined Milling Operation to Mill Keyways and Square the Ends Is Accomplished in a Standard Horizontal Milling Machine Equipped With Vertical Attachment

fixture between the two carriages, one of which is mounted on the front of the lathe and one on the back. The carriages are provided with heads having back geared milling spindles individually motor driven, and these milling heads are traversed along the roll to provide the milling feed to produce the T-slots. The milling cutters are guided by blocks sliding in the planed slots. The milling heads were designed and built at this factory.

The next operation on the roll consists of milling a clearance midway of the T-slot to widen it sufficiently to permit the dog to be removed from the slot without taking it all the way to the open end. The device with which this operation is accomplished is a special vertical milling head built by the company, shown in Fig. 5. The head has longitudinal adjustment and cross and vertical feeds. It is driven through a universal shaft from an air motor. The whole device is mounted on a base which clamps to the roll by means of a bolt in the T-slot.

Another vertical milling attachment designed and used by Walter Scott & Co. is that shown in Fig. 6, which is employed for squaring out the ends of keyways in shafting and is made to fit an ordinary horizontal milling machine. Multiple V-blocks are mounted on the milling machine table to hold several shafts at once, and a corresponding number of milling cutters is ganged on the arbor and serve to mill the keyways. The vertical attachment is driven by a chain from the milling machine spindle. It is adjustable horizontally on the overarm and may be pinned in place by a spring plunger in holes in the overarm, an arrangement intended to hold the vertical cutter in position corresponding to the

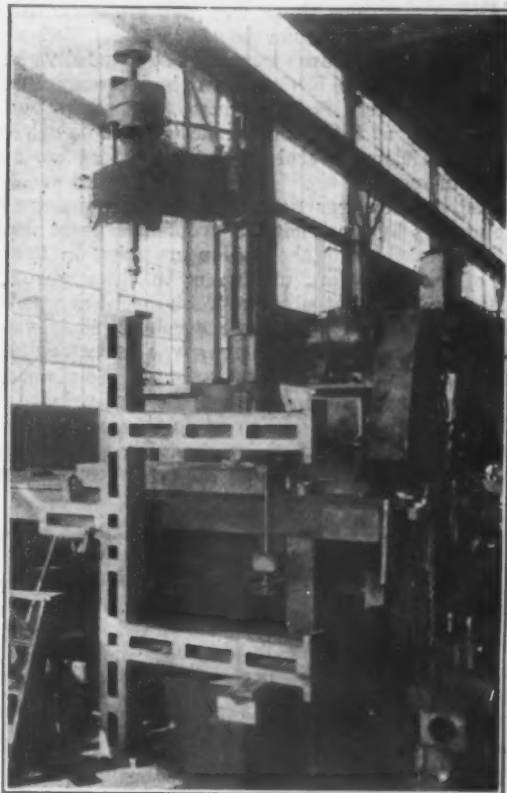


Fig. 7.—Mounting a Radial Drill on a Special Stand Avoids Dropping Large Work into a Pit for Drilling and Also Facilitates Chip Removal

### Bethlehem Steel Corporation's Savings Plan for Employees

President Eugene G. Grace of the Bethlehem Steel Corporation announced the inauguration of an employee's saving and stock ownership plan at the annual meeting of employees' representatives at the Lackawanna plant last week. He stated that the corporation will assist its employees to purchase 7 per cent cumulative stock on easy terms. This comes as the result of repeated requests to the management for a plan that will help workers to save systematically and, at the same time, to become part owners in the business. By the recent extension of properties and readjustment of the financial structure, Mr. Grace said, the offering was made possible.

Employees will be permitted to subscribe for one share of stock for each \$400 of annual earnings under the plan. The offering price for the first year has been fixed at \$94 per share, with credits for dividends and interest charges reducing the net cost. Special bonus payments on the stock, ranging from \$1 to \$5 per share over five years, will be made as an added incentive to employees.

Pressed metal engineering is to be discussed at a meeting of the machine shop section of the Providence Engineering Society at the rooms of that society on the evening of Feb. 12, by Douglas P. Cook, president Boston Pressed Metal Co., Worcester, Mass.

# Removing Dust from Blast Furnace Gases

Electrolytic Process Installed by Colorado Fuel & Iron Co.

—Corona Discharge Produces Ionized Field

Which Precipitates the Dust

BY N. H. GELLERT\*

FIVE years ago there was not an electrical blast furnace gas cleaner in the world. Today three installations are running successfully in the United States, two having been in more or less continuous operation for the last four years and one started lately at the plant of the Colorado Fuel & Iron Co. In addition, several of these cleaners are operating in Europe.

Blast furnace gas presented, to those interested in cleaning gas by electricity, a problem a great deal different from that of those pioneers who, in the early days of precipitation, undertook to clean gases from smelters and cement plants. Their problem was one of dust, while that of blast furnace gas is one of gas. To them the dust content of the gas was important because in the dust lay their greatest values. We clean to get rid of the dust, for in the gas lie our values. They could condition their gas so as to create the best possible operating conditions by changing the gas and its content, while we must leave the gas severely alone so

cent with a wet-cleaned gas. This was before the time of dry cleaners. To recognize what actual saving may be accomplished by the use of a dry cleaned gas as compared with a wet cleaned gas, it is necessary to examine the composition of blast furnace gases and determine what it is possible to do with these gases by wet cleaning and dry cleaning.

If blast furnace gas of the average composition shown in Table I is used for our purposes of discussion, it will be found that there is available as latent heat 5,447,200 B.t.u. in the 59,000 cu. ft. of gas which comes off from an average 500-ton blast furnace in one minute.

It will be noticed that the greater part of this gas is inert and has no latent heat of combustion. All gases, however, have a thermal capacity for carrying heat, due to the input of energy caused by the combustion of the gas itself and the consequent temperature to which these inert gases are raised.

If we compute the sensible heat existing in these gases between the limits of 0 deg. and 400 deg. Fahr.,

Table I.—Latent Heat of Combustion of Blast Furnace Gas

Constituent	Per Cent by Volume	Cu. Ft. per Min.	Weight per Cu. Ft. at 62 Deg. Fahr. (Lb.)	Total Wt., Lb.	Per Cent by Weight	Latent Heat in B.t.u.—		
						Per Cu. Ft. at 62 Deg. Fahr.	Per Lb.	Total per Min.
Carbon dioxide...	12.5	7,375	0.1163	838.3	18.6	.....	.....	.....
Carbon monoxide	25.4	14,986	0.0736	1,103.2	24.6	318.2	4,325	4,771,100
Hydrogen .....	3.5	2,065	0.0053	10.9	0.2	328.0	62,032	676,100
Oxygen .....	0.0	000	0.0841	000	000	.....	.....	.....
Nitrogen .....	58.6	31,574	0.0737	2,548.3	56.6	.....	.....	.....
Total .....		59,000		4,500.7				5,447,200

as not, by conditioning, to interfere with its combustibility. They dealt with non-inflammable gases and we deal with gases that burn.

## Gas Is Worth Cleaning

There is no doubt that every blast furnace man, who has gone through all the anguish of recheckering stoves because flue dust with a high alkaline content has burnt out his brick work, is convinced that blast furnace gas is worth cleaning. The value of clean blast furnace gas was discussed by me in a paper read before the Birmingham section of the American Society of Mechanical Engineers in October, 1921. I wish briefly to bring before you a few of the facts there presented to establish the values of clean blast furnace gas as against dirty gas.

Mr. Diehl, several years ago, showed that the available heat in raw gas was 77.03 per cent; the available heat in partially cleaned gas was 74.33 per cent, while the available heat in wet cleaned gas was 79.51 per cent. In his 1913 figures, he showed that the savings in increased stove efficiency was nearly 10c. per ton of iron, while the saving in limestone and the value due to increased production gave an additional 6c. per ton of iron made. Here is a total of 16c. per ton of iron in the saving caused by using a wet cleaned gas as against a dry, raw gas.

Figures taken from his paper show that the boiler efficiency was 62.3 per cent with dirty gas, and 66.1 per

which we may accept as the outlet temperature of the burnt gases, we find that there is an additional quantity of 499,040 B.t.u. in the form of sensible heat. We are thus able to compute the total sensible heat at limits 0 deg. to 62 deg. Fahr. These figures, subtracted from the sensible heat at the limits 0 deg. to 400 deg. Fahr., give sensible heat of gas at 400 deg. Fahr. as 499,040 — 74,390 = 424,650 B.t.u. per min.

The total thermal value of the gas which comes from the furnace is 5,772,500 B.t.u. per minute. This is true of dry cleaned gas having a moisture content of 35 grains per cu. ft. at standard conditions of temperature and pressure. With wet cleaned gas, which it will be assumed is reduced to a temperature of 70 deg. in the cleaning, with a moisture content of 7.89 grains per cu. ft., the net latent heat value is of course exactly the same. Adding to this the net sensible heat of the gas, it will be found that there is available 5,425,520 B.t.u. per minute.

Now when using a dry cleaned gas, the products of combustion as calculated, have a total weight of 4795.7 lb. with a volume of 59,000 cu. ft. at 62 deg. Fahr. The determination of the sensible heat of these products of combustion at 600 deg. (Table II) shows that the gas has a total sensible heat of 1,194,980 B.t.u., from which must be deducted 114,380 B.t.u. which were present in the beginning.

Then the net sensible heat of the products of combustion will be 1,194,980 — 114,380 = 1,080,600 B.t.u. per minute.

The total value of the original gas for both latent and sensible heat was 5,772,500 B.t.u. The net sensible

\*President Gellert Engineering Co., Philadelphia. This is abstract of a paper read before the Pueblo Society of Engineers, Pueblo, Colo., Dec. 17.

heat of the products of combustion is 1,080,600 B.t.u.; gross available heat, 4,691,900 B.t.u., and 10 per cent lost because of the original loss in gas, 469,190; net available heat per minute, 4,222,710 B.t.u.

The gas therefore escapes with a net total of 1,080,600 B.t.u., leaving 4,222,710 B.t.u. The net total avail-

at 0.6c. per 100,000 cu. ft. of gas, then, based on the use of 0.3 kw. per 100,000 cu. ft. of gas, there will be a saving of 2.4c. per 100,000 cu. ft. of gas, or 4.1c. per ton of pig iron made, when using electricity instead of water as a cleaning medium. The savings can be tabulated in somewhat this fashion:

15.9c. per ton of pig iron made, due to the use of wet cleaned gas in a hot stove as against raw gas.  
15.6c. per ton, due to using hot cleaned gas as against wet cleaned gas for thermal value alone.  
4.1c. saving in the operating of a dry cleaner as against the wet cleaner, making a total saving of 35.6c. in the use of hot cleaned gas over dirty gas.

It has been estimated that about 5c. a ton of iron is saved in using dry cleaned gas as against wet cleaned gas in boilers. It is also estimated that at least 6c. is saved in the preservation of boiler brick, hot stove brick and linings, due to the use of a cleaned gas as against a dirty gas, which gives an additional 11c. saving per ton of pig iron or a total saving of 46.6c. per ton of pig iron. In a year, on a 500-ton furnace, this saving will amount to over \$85,000.

Many benefits to be derived in cleaning gas electrically can be mentioned briefly. Ease of operation, elimination of stream pollution, simplicity of plant construction, non-requirement of water, cleanliness of the plant and other matters all are factors which should be considered in a cleaning plant.

### Principles of Electric Cleaning

We are all familiar with the old high school experiment where a pith ball was charged and repelled from the charged body. This simple fundamental experiment is really the basic principle of the electrostatic precipitation of dust from blast furnace gases.

Current at 220 volts is impressed on a transformer especially built for the rugged service required in this kind of work. Here it is stepped up from 220 volts to approximately 35,000 or 40,000 volts. The alternating current at this high voltage is then converted to unidirectional or so-called direct current at the high voltage by means of a rectifier.

Unidirectional current at a high voltage is secured for precipitation. The precipitator itself is filled with 6-in. steel pipes, each of which has suspended through its center a negative electrode of chain or wire held taut by a 15-lb. cast iron weight. This electrode is properly insulated and is directly connected to the output side of the mechanical rectifier.

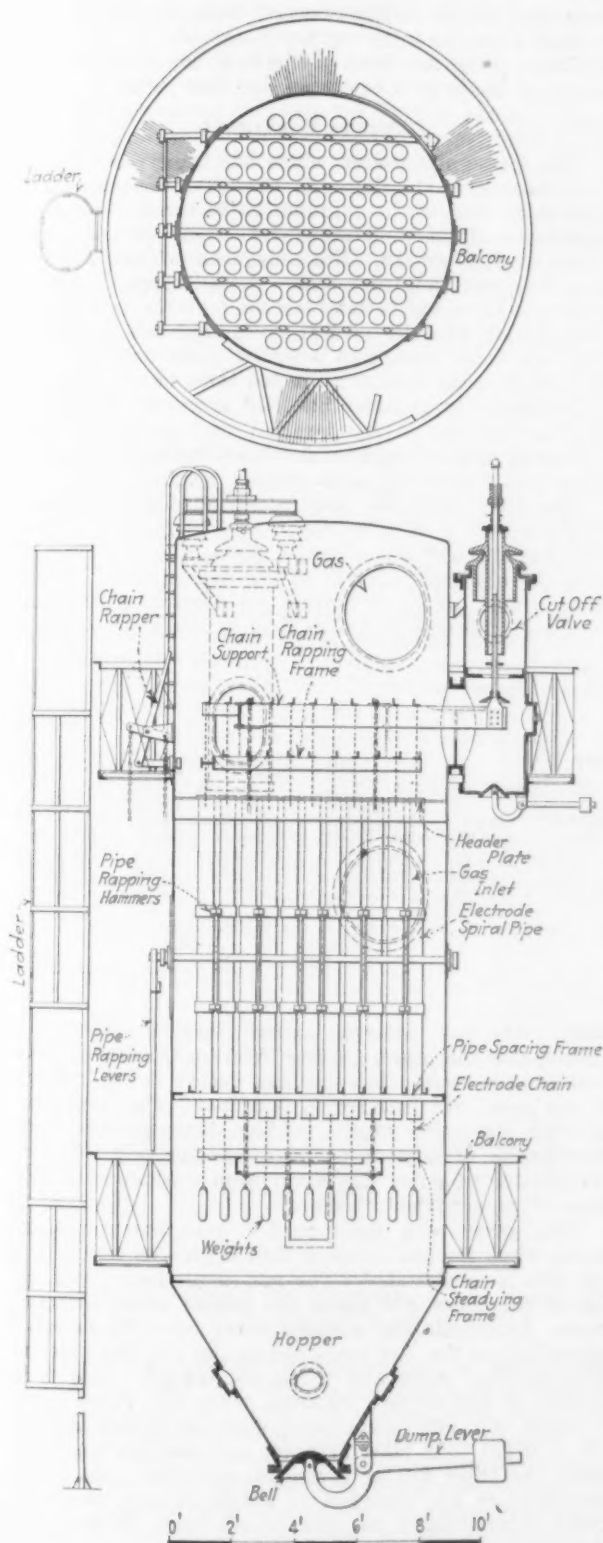
If a mechanical rectifier is not used, kenotrons may be used. These kenotrons are more familiar now to laymen than they were before the days of radio broadcasting. In principle they act somewhat the same as electrical check valves, allowing electrical impulses to flow in one direction only, by virtue of hot and cold electrodes.

### Action of Corona Discharge

By the impression of voltage in the center of the pipe, a corona discharge takes place between the chain as a negative electrode and the pipe as the positive electrode. This corona discharge—easily seen when looking through the bottom or top of an open precipitator—gives off a faint bluish light which, under certain conditions, looks like a snowstorm in the dark. Any gas which passes through this highly ionized field is bound to become ionized of itself, and any particles of dust found in the gas receive an electrical charge from the ionized gas similar to the charge carried by the negative electrode.

These charged dust particles are repelled to the sides of the pipe and held there until the electrical current is shut off. Every particle of dust, therefore, is affected by an oblique force which is the resultant of the force due to the velocity of the gas passing up through the pipe and the horizontal force of the electrical impulses, forming a gradient which makes precipitation possible. In the design of a precipitator, therefore, it is necessary to see that the resultant forces acting on each particle of dust are sufficiently near the horizontal so that precipitation may be effected within the pipe during the time that the particle of dust is traveling from bottom to top.

The dust, having been deposited on the sides of the



Sectional Elevation and Plan of an Electrolytic Unit for Depositing Blast Furnace Dust and Cleaning the Gas Without Use of Water

able in wet cleaned gas on the other hand is 3,964,995 B.t.u., or a difference of 257,715 B.t.u. per minute. This difference has been calculated to amount to 15.6c. per ton of iron in the saving of coke alone.

Wet cleaners will cost for water alone approximately 3c. per 100,000 cu. ft. of gas. If the labor for both the wet and dry cleaners is assumed to be the same, and the charge against the dry cleaner is taken

pipe, will build up until that point is reached when insulation will take place to such an extent that the corona discharge between the negative and positive electrodes is considerably weakened. At this point the precipitator should have the current cut off and the pipes should be rapped by mechanical hammers installed for that purpose. On rapping, the dust drops from the pipes into a hopper at the bottom of the precipitator, and may be discharged at intervals of 12 or 24 hr., depending on the size of the hopper.

This in brief is the theory of precipitation. The construction and operation of a precipitator, or more truly an electrical gas cleaner, are as simple as the theory itself.

#### Development of Apparatus

When Dr. F. G. Cottrell decided to make use of the fundamental principles of corona discharge, in aiding industry get rid of dirt and dust nuisances, he had before him the problem of finding electrical equipment which could give him continuously, and without too much expenditure, the electrical effects needed for the purposes of precipitation. It was no easy task to develop this electrical equipment. Great credit is due the large electrical companies, particularly the General Electric and Westinghouse companies, for the initiative, energy and intelligence which they have given to the general problem of precipitation. Without their work in the development of electrical apparatus it would have been impossible for precipitation to have taken the lead in the field of cleaning gases which it now holds.

But electrical equipment was not alone required. In-

worked as effectively on one gas as on another and the results obtained in cleaning have been uniform. Such tests as have been made at various times by actual measurement indicate that cleaners are removing all the dirt from the gas down to a point where only 0.3, and down to less than 0.2, grain of dust per cu. ft. remain in it. The greatest measurement, however, has been that of the increased stove heats and of the decreased losses in brick work throughout the plant. In addition, there has been a physical demonstration by means of the large amounts of flue dust collected.

#### Colorado Equipment

The latest installation which has been made is that now running at the Colorado Fuel & Iron Co., Pueblo. This small unit is the culmination of the five years of experience obtained in the operation of the plants at Dunbar and Sheridan. Not only does it contain many improvements that the other installations naturally could not have, but it has been built on the new standardized plan whereby several small units take the place of a few large ones, and whereby these units may be fabricated in the shop and erected there ready to be set up without any considerable field erection. Precipitation has become so standardized that these unit precipitators may be used at any blast furnace operating under any conditions, with similar results.

The unit which has been constructed here contains 90 pipes each 6 in. in diameter and 10 ft. long. Each pipe has through its center a chain which is charged with the electrical current of the precipitator. All of these chains are hung from a top frame and steadied by a rigid bottom frame so that no swaying can take

Table II.—Determination of Sensible Heat of Products of Combustion of Hot Gas at 600 Deg. Fahr.  
(Figured on a dry basis.)

Constituent	Per Cent by Volume	Per Cent by Weight	Cu. Ft. at 62 Deg. Fahr.	Total Weight, Lb.	At 600 Deg. Fahr.			At 62 Deg. Fahr.		
					Specific Heat	B.t.u. per Lb.	Total Sensible Heat	Specific Heat	B.t.u. per Lb.	Total Sensible Heat
Carbon dioxide....	25.1	34.5	22,361	2,581.3	0.2260	135.60	350,020	0.1937	12.0	31,000
Aqueous vapor....	...	...	8,289	393.1	0.4818	289.08	113,640	0.4264	25.4	9,980
Nitrogen .....	74.9	65.5	66,818	4,922.7	0.2476	148.56	731,320	0.2412	14.9	73,400
Total.....	100.0	100.0	97,468	7,897.1	0.2522		1,194,980	0.2341		114,380

sulators had to be devised to withstand high voltages under conditions of mechanical, electrical and physical stress present in no other kind of service. Having worked out all the problems in connection with the electrical equipment and insulators, there was left only the problem of structural detail to build precipitators which would withstand the rough usage a blast furnace usually gives its auxiliary equipment.

#### First Installations

The history of blast furnace precipitation has been interesting. Five years ago it was undertaken at the plant of the American Manganese Mfg. Co., Dunbar, Pa., on a problem far greater than had ever before been approached.\* This furnace was then making ferromanganese. The furnaces had top heats as high as 1200 deg. Fahr. The gases were what is known as limey and contained a very high percentage of alkaline and manganese fume. The problem of cleaning these gases was so great that large expenditures of money for all sorts of wet cleaners had been made to no purpose. The electrical method was tried because no other method had proved successful. The first electrical blast furnace cleaning plant in the world was then designed and installed at this plant.

Shortly thereafter another plant was built to clean the gases from a smaller furnace at Sheridan, Pa. This plant also has been operating during these years without difficulties of any sort.

Since the electrical cleaning plants were first installed at these two points the furnaces had intermittently been making first ferromanganese, then spiegel-eisen and then pig iron. The electrical cleaners have

place. The gas, entering under a header at the top, envelops all the pipes, heating them up to an even temperature, so that, when the gas enters at the bottom of the pipes, the distribution is proper. The inspection of these pipes time after time has shown such an even distribution of dust as to prove conclusively that the distribution of gases has never been a problem in this type of an electrical cleaner.

The gases with their burden pass partly up the pipes, when the electrostatic field begins its action and the dust is precipitated. The gas then passes from the top of the pipes and above the header outlet into the main. Intermittently, perhaps every 30 or 60 minutes, depending on the dirt contained in the gas, the precipitator is shut down and the pipes rapped. This is a matter of one or two minutes, when the precipitator is again put into operation. With an installation of six or eight to a blast furnace, one precipitator is off while the other five or seven are operating. As these precipitators are designed to handle a safe overload, there is practically no loss in efficiency during the cleaning periods.

Precipitators are designed to handle gas flowing through them with velocities ranging from 10 to 15 ft. per sec., depending on the nature of the gas. The more we deal with precipitators the more we realize that blast furnace gases act the same at all plants and that precipitators which will work well between 10 and 15 ft. velocity will work well anywhere.

When precipitators are installed in groups they may be placed in a long line or put in couples. With the most modern type two of the 90 pipe units are installed together on one electrical unit, with a capacity rated at nearly twice the consumption of current of both pre-

\*See page 329, THE IRON AGE, Aug. 11, 1921.

cipitators. The reason for this is that, during an arcing period, a momentary overload may be twice the actual capacity and the equipment for precipitation must stand the terrific blows which occur at rare intervals.

#### Action During Slips

During slips the dust content is naturally greater and the velocity of the gas is somewhat greater. This point, however, must be borne in mind, that the dust content of the gas increases in a great degree during the slip while the velocity of the gas increases to a small degree. The precipitator is designed to operate at certain velocities and, unless these velocities become excessive, it will function properly, irrespective of the dust content of the gas. For this reason the precipitator will remove a large amount of the dust during a slip, while wet cleaners will fall down under the same conditions.

#### Cost of Operation

The operating cost of a precipitator is small, as one

man can handle the plant which will clean the gas coming from one, two or three furnaces. The dust which accumulates in the hopper will have to be handled by other men but, since the hoppers need be cleaned but once in 12 or 24 hr., this is a small matter. As the hoppers are self-dumping, one man can discharge all the dust accumulated under these conditions. A 500-ton furnace will furnish anywhere from 20 to 30 tons of flue dust in 24 hours. The damage which such a large tonnage of dirt shoved into the boilers and hot stoves can do is easily pictured.

Electrical cleaners consume but small amounts of current. It is figured, from experiments obtained at the operating plants, that about 0.3 kw. is consumed in the cleaning of every 100,000 cu. ft. of gas. Since there are no big operating parts, the only moving part being a small 2-hp. motor operating the rectifier, maintenance and repairs are small. I do not believe that the bill for maintenance of the plant at Dunbar in four years has amounted to \$500.

### Malleable Casting Production

WASHINGTON, Feb. 1.—The Department of Commerce announces statistics on the production of malleable castings manufactured for sale by months. The returns include only those castings manufactured for sale as such and do not include those used in the plant or finished and sold as other products.

Figures are also shown comparatively for June, July, August, September, October, November and December, covering the operations of 107 identical plants for which reports were received each month.

Month	Plants Re- porting (Number)	Total Pro- duction (Tons)	Total Ship- ments (Tons)	Orders Booked (Tons)	Monthly Capac- ity of Plants (Tons)	Per Cent of Total Capacity Operated
May	99	64,726	62,806	52,898	91,174	71.0
June	109	65,168	64,698	42,067	96,240	67.7
July	112	57,881	60,102	41,723	98,241	58.9
August	116	68,069	65,405	39,830	103,068	66.0
September	116	60,930	59,396	38,636	101,750	59.9
October	116	62,238	59,129	48,621	103,837	59.9
November	125	52,727	49,426	37,231	107,350	49.1
December	126	49,724	46,664	45,012	106,825	46.5

Comparative Summary for 107 Identical Plants

Month	Plants Re- porting (Number)	Total Pro- duction (Tons)	Total Ship- ments (Tons)	Orders Booked (Tons)	Monthly Capac- ity of Plants (Tons)	Per Cent of Total Capacity Operated
June	107	63,298	62,888	39,814	94,840	66.7
July	107	54,433	55,922	39,131	94,826	57.4
August	107	63,038	60,207	36,753	94,858	66.5
September	107	56,024	54,378	35,452	93,565	59.9
October	107	56,798	54,221	43,978	95,652	59.4
November	107	47,112	44,215	34,817	95,801	49.2
December	107	44,580	41,328	40,800	94,751	47.1

### Kalman Steel Co., Chicago, Buys Corrugated Bar Co., Buffalo

Purchase of the Corrugated Bar Co., Buffalo, by the Kalman Steel Co., Chicago, has just been announced by Paul J. Kalman, president of the latter organization. Acquisition of the Buffalo company is expected to put the Kalman Steel Co. in first place among distributors of reinforcing steel bars in the United States. Both the Kalman Steel Co. and the Corrugated company are fabricators of building materials and reinforcing bars. The merged organizations will be operated under the name of the Kalman Steel Co., with capital stock of approximately \$2,000,000. The Kalman company will take possession of the Corrugated Bar Co. plants at once, but the actual operation of the Corrugated company by the Kalman organization will not begin for about 30 days.

Plants of the Corrugated Bar Co. are located at Hammond, Ind., Buffalo, Boston, Philadelphia and Atlanta, while the Kalman company already has plants at Chicago, New York, Youngstown, St. Paul and Minneapolis.

The Corrugated Bar Co. was organized in 1892 and the Kalman company in 1901. Now located at 22 West Monroe Street, Chicago, the Kalman Steel Co. will re-

move its main offices, March 22, to the Wrigley Building, where it will occupy the entire fourteenth floor.

Paul J. Kalman, who will become president of the new organization, is also chairman of the board of directors, Globe Steel Tubes Co., Milwaukee, Wis., president Bliss & Laughlin, Inc., Chicago, and president Hudson Motor Co. of Illinois, Chicago. The Globe Steel Tubes Co. manufactures steel tubing and the Bliss & Laughlin company cold drawn steel.

George E. Routh, Jr., who with Mr. Kalman founded the Kalman Steel Co., will be vice-president. Other officers of the reorganized company will be as follows: J. A. Cathcart, assistant vice-president; A. E. Pinard, treasurer; A. P. Clark, general manager of sales. Mr. Clark held the same position with the Corrugated Bar Co. prior to its purchase. W. S. Thomson, chief engineer Corrugated Bar Co., will have the same position with the Kalman Steel Co. L. O. Helgesen will be Eastern sales manager with headquarters in New York.

The Kalman Steel Co. started business in a small way in St. Paul in 1901 and established its main offices in Chicago in 1920.

### Economics for Employees

Under the above title the American Management Association, 20 Vesey Street, New York, has published a 20-page pamphlet covering the report of its committee on economics. Fifteen concerns or institutions are listed as having a known system of imparting economic knowledge to their men. These include the Brooklyn Edison Co., Bridgeport Brass Co., Cambria Steel Co., American Steel & Wire Co. and American Rolling Mill Co., besides a number of insurance companies, banks, etc. The committee worked out a list of topics frequently recurring in discussions with employees, as a suggested basis for talks on the subject, and briefly discusses some of the methods used by companies which have taken up this work.

One recommendation is to keep the groups or classes small—10 or 12 individuals. In some cases, however, where the work has been carried on by means of definite papers with lantern slides, moving picture projections and other visual means of carrying the message, the groups have been large and have participated, after the paper, in lively discussion of the points brought out.

The Krupp Co. of Germany will take over Spain's oldest engineering works, La Maquinista Terrestre y Maritima, and also the Cardona dockyard, according to a dispatch from Barcelona. It is understood that the Germans will supply technicians, and Spanish banks the capital for extensions and that large orders will be placed for work proscribed in Germany by the Treaty of Versailles. Steamers will be built at the plant for German and South American lines and locomotives for Spanish railroads.

# Conical Illumination in Metallography\*

## New Method of Illuminating Opaque Objects Obliquely —Practical Application and Advantages

BY HARRY S. GEORGE

**A**BILITY to distinguish and interpret metal structures is fundamentally affected by the method of illumination. The methods heretofore in use are of two distinctly different kinds. The distinguishing difference is that while in one system, light is admitted to the object through the objective, returning upon itself through the objective and being suitably deflected to the observer; in the other system, light is thrown on the object from some point outside the objective and then is reflected through the objective to the eye. The first system is known as vertical or axial illumination and the second, as oblique illumination. These have become so familiar to metallurgists through long use, that anything radical in the way of improve-

Furthermore, as the trend of practice seems to require examination at higher magnifications, any method imparting a natural appearance should be adapted to high power lenses.

### Conical Illumination Described

The method described in this paper is applicable to all objectives for it is based on the fact that the objective itself is transmitting oblique as well as axial light to and from the object. Reference to Fig. 1 will make this clear. The arrangement shown is purely diagrammatic, the usual glass reflecting disk, stellite mirror and eyepiece being omitted for simplicity. Also, of course, in actual practice, the light source is not a point

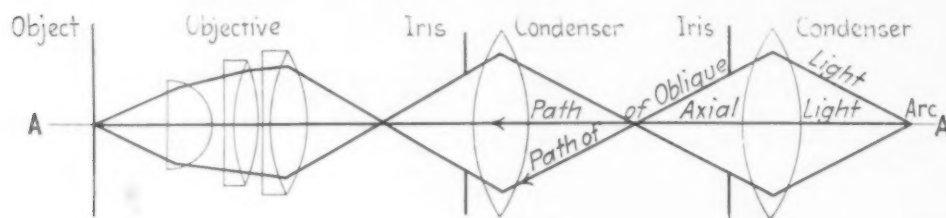


Fig. 1—Diagram of Path of Light in Metallographic Microscope, Using Vertical Illumination

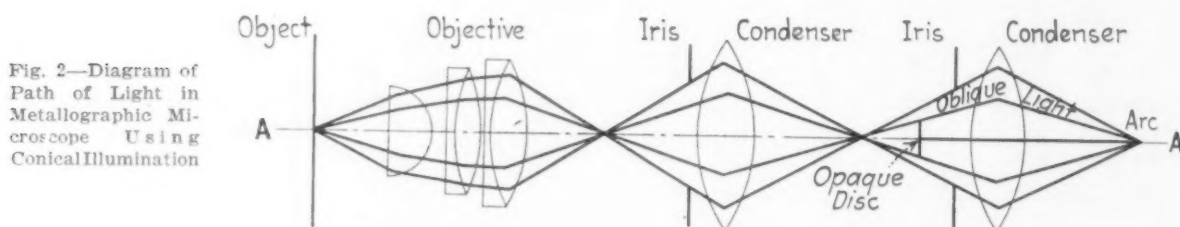


Fig. 2—Diagram of Path of Light in Metallographic Microscope Using Conical Illumination

ment or modification will be greeted with at least a degree of curiosity or even doubt.

Metallurgists become so familiar with metal structures that they perhaps do not realize that the mental picture seldom coincides with the physical image in the microscope. The process of examination has become second nature and the observer is not always aware that he is not actually seeing physically all that he visualizes mentally. To take a simple illustration, a polishing scratch on a polished metallographic specimen appears under vertical illumination to be a black line on a bright surface. We interpret this to mean that a hard abrasive particle has plowed a furrow through a yielding metal even though the furrow is not seen. Again, a polygonal configuration of thin black lines on a bright surface is the outlined cross-section of grains of metal although few know the nature of these outlines, whether a grain boundary is a step down from one level to another, or a ditch etched out between grains, or a ridge.

The reason why constituents are seen only in outline under vertical illumination is, of course, that they are illuminated by light parallel, or very nearly parallel, to the axis of the lens system, and as this light falls normally upon the surface of the object no shadows are cast and very little shading is manifest. This is an unnatural condition but has become so familiar as to seem natural. It would be desirable, then, to view microscopic objects in a more natural way; to see them in relief, as one sees a man's facial characteristics.

nor is it situated at the focal distance from the condenser. The design of the figure is merely to show clearly the fact that so-called axial illumination is really composed of true axial light and, also, of oblique light.

Light traveling approximately parallel to axis AA of the lens system (axial light) falls normally upon the object and masks any relief effect produced by the oblique light. To obtain relief, it is necessary to stop out axial light only. One way of doing this is to place an opaque disk in the illuminating beam perpendicular to the axis AA. (See Fig. 2.) An image of the disk is formed near the back lens of the objective, thus producing a hollow cone of light in the objective, having its apex on the object.

Since making this simple discovery, it has been pointed out to the writer that the method is essentially similar to oblique illumination by means of a substage condenser and stop in ordinary microscopic work with transmitted light. With reflected light and vertical illumination, the objective takes the place of the substage condenser and instead of placing a stop at the back lens of the objective, this method virtually places one there by the expedient of locating the image of one at that point.

The disk is preferably placed slightly eccentric so that light will fall upon the object from one direction. The particular direction of illumination, as well as the size of the disk, is best determined by trial for each individual subject and purpose.

While in some cases a definite, fixed size and position of stop is adequate, yet in most instances it is desirable to be able to rapidly change the size of stop and to rotate the direction of light. For this purpose, the

\*Abstract of a paper presented at the annual convention of the society in Pittsburgh, October, 1923. The author is associated with the Union Carbide & Research Laboratories, Inc., Long Island City, N. Y.

writer has had constructed the two devices illustrated in Figs. 3 and 4.

The contrivance shown in Fig. 3 is simply an assortment of stops of different sizes mounted on the spokes of a wheel. As the wheel is rotated, any stop can be swung into position. The arm on which the wheel is mounted is pivoted at its base so that the entire appliance can be swung out of the way. Any stop may be rotated about the optic axis by a compound rotary and pivotal motion of the wheel. The shadow of the stop

Fig. 3—Device (in circle) for Obtaining Conical Illumination. The disks are mounted within a wheel so that they may be readily adjusted in the path of light

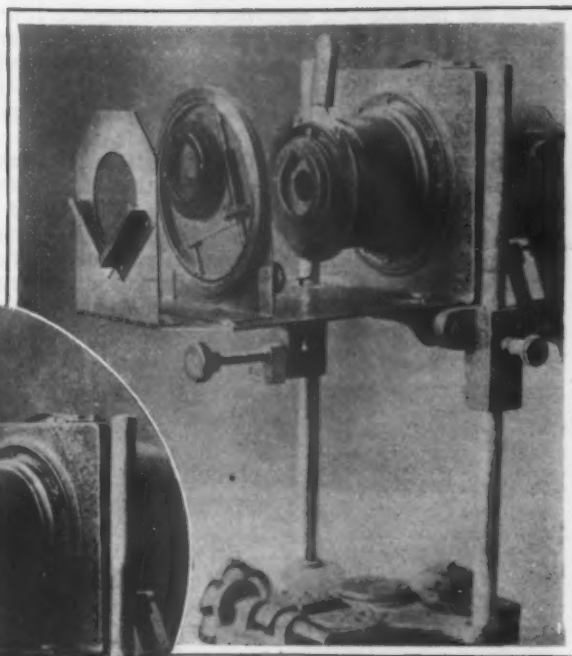
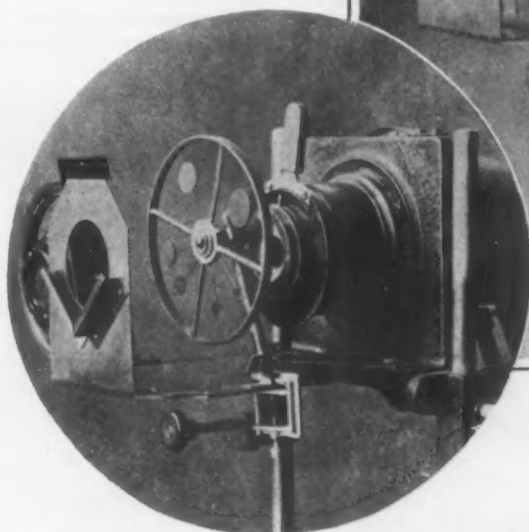


Fig. 4—Device for Obtaining Conical Illumination Using an Auxiliary Iris Diaphragm Mounted Within a Wheel Whose Center Is at the Optic Axis

on the filter affords a convenient means of noting its position.

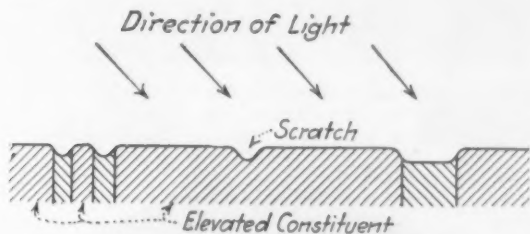


Fig. 6—Sketch Showing the Profile of Scratch (at AA, Fig. 5) Illustrating Method of Determining Direction of Light Used in Photographing

The device illustrated in Fig. 4 serves the same purpose in a different way. It consists of an auxiliary iris diaphragm mounted within a wheel whose center is at the optic axis. The knurled adjusting nut controls the degree of eccentricity of the auxiliary iris. With the microscope nicely adjusted, the latter method is more conveniently operated than the one first described. Moreover, it is the more rugged in construction but has the disadvantages of requiring more accurate adjustment of the microscope and of cutting down the amount of light.

#### Terminology and Microscopic Appearances

In the following, the term conical oblique illumination or simply conical illumination will be used to des-

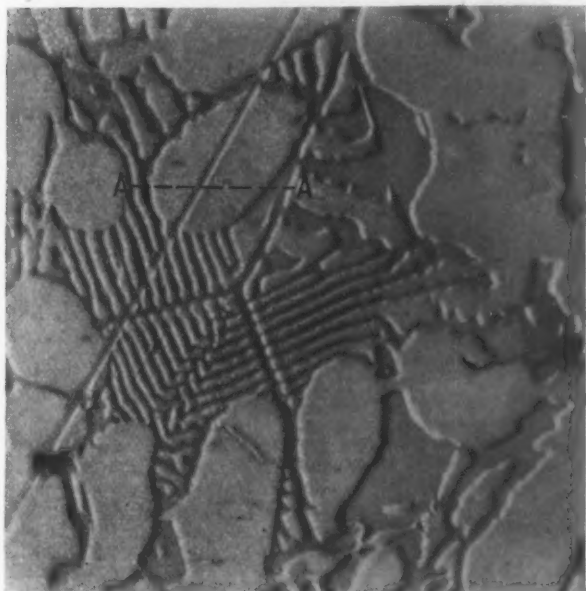


Fig. 5—Photomicrograph of Etched, Complex Alloy Under Conical Illumination. This photomicrograph shows the same field as Fig. 5-R, but in photographing, the direction for illumination for Fig. 5 was from left to right, while for Fig. 5-R it was from right to left. (x 4000, 1.9 mm. objective, 10.0 x eyepiece.) Reduced about one-half from the original



Fig. 5-R—Photomicrograph of Same Field as Fig. 5. If Fig. 5 and Fig. 5-R are illuminated by a strong light from the left, Fig. 5-R usually presents an illusion, making the broad light areas appear depressed, whereas in reality they are elevated as usually apparent in Fig. 5. (x 4000, 1.9 mm. objective, 10.0 x eyepiece.) Reduced about one-half

ignite the method just described to distinguish it from oblique illumination as ordinarily applied. The terms vertical, normal and axial illumination refer to so-called vertical, that is, mixed axial and oblique illumination, commonly obtained when the object is illuminated through the objective.

Oblique light as ordinarily applied is so nearly parallel to the surface of the object that it is not reflected from a perfectly plane surface through the objective to the eye because the angle of reflection equals the angle of incidence. Consequently, plane surfaces appear dark by ordinary oblique illumination and bright by ordinary vertical illumination. Rough surfaces, depressions or elevations, for the same reason, appear

used in all cases. The photographic plates were standard orthonon.

With few exceptions the photomicrographs shown here, which were taken by oblique conical illumination are orientated the same with respect to the direction of light used in photographing which is, with respect to these pages, downward from left to right, at an angle of 45 deg. The left side of elevations and the right side of depressions will then appear bright. The sense of sight is very easily deceived, however, and unless the direction of light used in photographing is known, it is impossible to tell, in the case of unknown structures, whether the appearance is real or an illusion. It will aid in avoiding the illusion if the light used in examin-



Fig. 7—Photomicrograph of Etched Complex Alloy Under Conical Illumination. (x 2000, 1.9 mm. objective, 6.4 x eyepiece.) Reduced about one-third



Fig. 8—Photomicrograph of the Same Field as Fig. 7 Under Vertical Illumination. (x 2000, 1.9 mm. objective, 6.4 x eyepiece.) Reduced about one-third

either light or dark, depending on whether they are viewed by ordinary oblique or by ordinary vertical illumination. In other words, the view obtained by ordinary oblique light is the negative to the positive appearance obtained from ordinary vertical illumination.

Conical oblique light, on the other hand, does not give this negative appearance. The rays of light in this case are more nearly parallel to the optic axis and, therefore, are reflected back through the objective from plane surfaces, making them appear bright, as with so-called vertical illumination, and imparting a natural relief effect to the appearance.

#### Conical Illumination and High Power

Resolution, which is the optical quality of differentiating or distinguishing as such two lines which lie side by side, is directly proportional to the numerical aperture of the objective. In general, the greater the aperture, the more resolution attainable. Also, the greater the aperture, the more oblique are the outer rays in the light cone, between the objective and object. It is also evident that immersion oil will increase the obliquity of the extreme rays because its index of refraction is greater than that of air. As the method of conical illumination depends for its effects on the obliquity of the light passing through the objective, it follows from the above optical considerations that it is particularly adapted to high power work.

#### Illustrations and Apparatus

The accompanying photomicrographs will illustrate the method in its application to low and high power objectives. They were taken with a Bausch & Lomb inverted metallurgical microscope and camera mounted on a horizontal bed. A Wratten B filter was used in conjunction with a direct current arc for illumination. Achromatic objectives and Huygenian eyepieces were



Fig. 9—Field Lighted from the Left Shows Angular Material Deeply Recessed by Etching, Contrasting with the Scratch Running Diagonally Across the Field. The light colored areas, whose west slopes are lighted and whose east slopes are shaded, are plateaus. Reduced about one-half from an original of 2000 dia., etched

ing the micrographs be a strong one and have the same direction as that used in photographing.

One of the exceptions in orientation mentioned above is Fig. 5R which, when compared with Fig. 5 under a strong light from the upper left illustrates the illusion referred to. Under this condition of lighting most observers see Fig. 5R as the inverse of Fig. 5. The reason

for this is that while the fields are orientated the same, the direction of light was reversed in Fig. 5R. What are elevations in one seem to be depressions in the other. Turning the pictures upside down or allowing the light to come from lower right usually inverts the appearance of both pictures. When one is familiar with a particular structure the illusion rarely occurs irrespective of the direction of light used in photographing relative to that illuminating the picture. The illusion may also manifest itself while an object is being examined through the microscope, but only rarely with known structures or when a known detail such as a polishing scratch is visible in the field.

The point to be emphasized in connection with conical illumination is that in interpretation of structure, it is dangerous when examining an unknown structure to rely on appearances. For correct interpretation, the direction of illumination must be known. The facts of relief must then be deduced. If the appearance co-

incides with the deduction, it is real. If it does not, it is an illusion. When this process has been applied to a view which persists in being an illusion, it will suddenly invert and present the true appearance.

Fig. 5, 5R ( $\times 4000$ , etched) are of the same field as Fig. 9 but at twice the magnification. No advantage is derived from the higher magnification. It is appar-

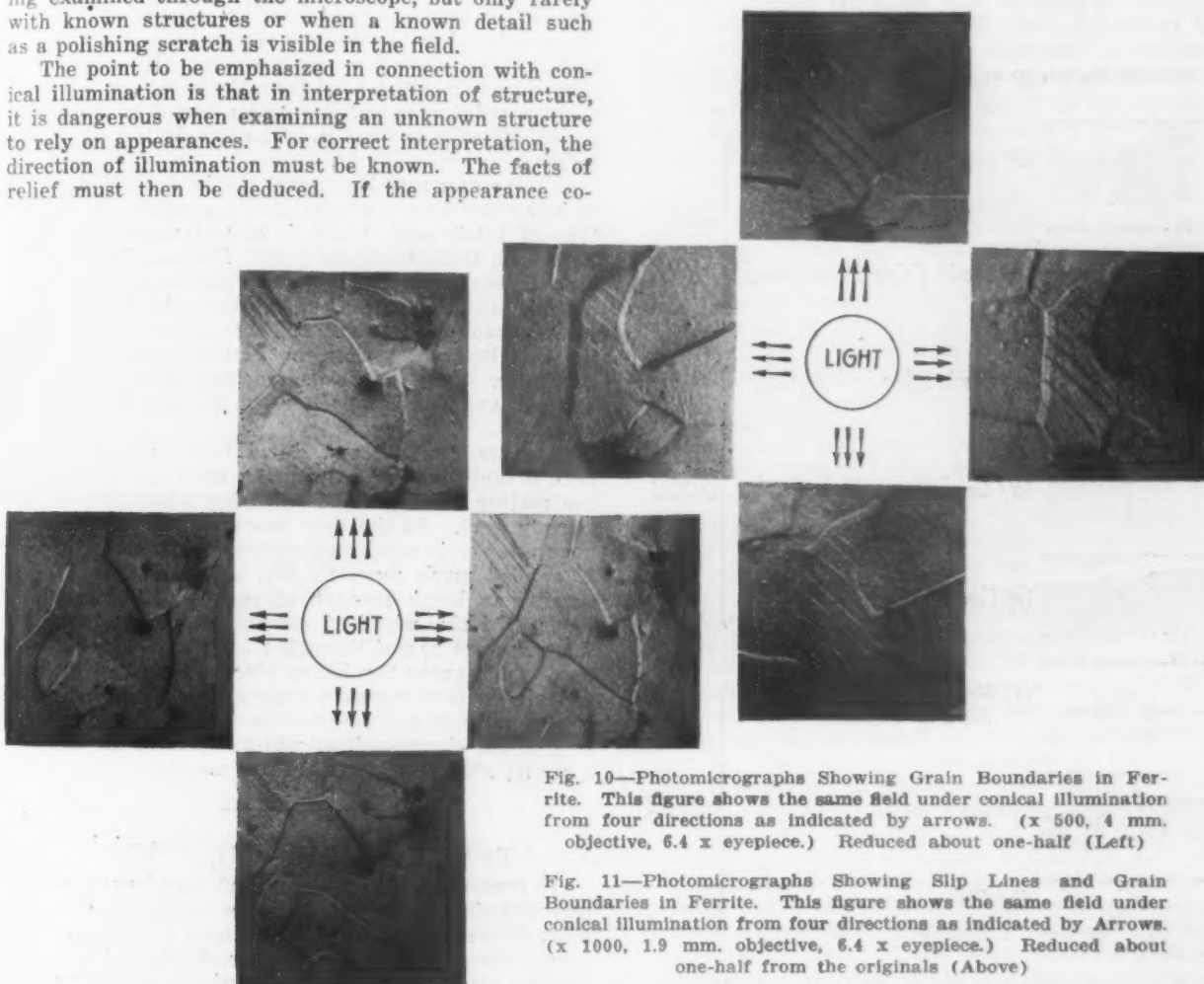


Fig. 10—Photomicrographs Showing Grain Boundaries in Ferrite. This figure shows the same field under conical illumination from four directions as indicated by arrows. ( $\times 500$ , 4 mm. objective, 6.4 x eyepiece.) Reduced about one-half (Left)

Fig. 11—Photomicrographs Showing Slip Lines and Grain Boundaries in Ferrite. This figure shows the same field under conical illumination from four directions as indicated by Arrows. ( $\times 1000$ , 1.9 mm. objective, 6.4 x eyepiece.) Reduced about one-half from the originals (Above)

ent, however, that magnification is no obstacle to this method.

#### Value of Polishing Scratches

Because of the foregoing when examining an unknown structure, if this illusion proves confusing, it is advisable to analyze the structure with reference to a known surface detail such as a polishing scratch. If a scratch is large enough or under sufficient magnification it serves as a criterion to determine whether the illusion is present. Reference to Figs. 5 and 6 will make clear the use of a scratch in determining the direction of the light. Fig. 6 is a profile across the scratch at AA. From Fig. 5, it will be seen that the left side of the scratch is darker than the right, hence the light is coming from left to right as shown by the arrows in Fig. 6.

#### Other Practical Applications

Other interesting features attending the use of oblique lighting are to be noted in Figs. 7 and 8 ( $\times 2000$ , etched) are of a different material at higher magnification, as is also Fig. 9 ( $\times 2000$ , etched). Incidentally, the angular material in Fig. 9 has been proved, by focussing measurements, to be actually deeply recessed by etching. This corroborates the evidence furnished by the scratch which runs diagonally

#### Grain Boundaries Under Conical Illumination

In the introductory remarks of this paper the nature of grain boundaries was referred to. In the case of a pure metal, or of a solid solution, it has been inferred by some from focussing measurements that the surfaces of individual grains etch to varying depths owing to the differential existing between the rates of attack along different crystallographic axes. From this it is commonly conceded that black lines representing grain boundaries are really steps from one grain level to another. If this needs corroboration, it receives it from examination of grain boundaries under conical illumination. In Fig. 10 is shown the appearance of grains of ferrite etched with picric acid in alcohol, strained by compression, and magnified  $\times 500$  under conical illumination. A similar series, taken with oil immersion objective ( $\times 1000$ ) of a different field, is shown in Fig. 11.

The difference between the photomicrographs in Figs. 10 and 11 illustrates an interesting application of conical illumination similar in effect to that produced under ordinary oblique light by rotating the specimen. In the present case, the direction of illumination was changed in 90 deg. steps. Thus, in the left-hand photomicrograph the direction of the light for photographing was, with respect to these pages, horizontally from right to left; that for the upper photomicrograph was vertically upward; for the right-hand photomicrograph

horizontally from left to right, for the lower photomicrograph vertically downward. Knowing the direction of illumination, it is easy to tell by inspection, the relative elevations of the grains.

In addition to corroborating the step theory of grain boundaries, several other features are revealed by these illustrations. Referring to Fig. 10, (upper and lower photomicrographs), the short horizontal grain boundary in the top center is evidently a ridge, for in the upper photomicrographs, its lower slope is lighted and its upper is dark, while in the lower photomicrograph, the reverse is true. Furthermore, the curving grain boundary in the center of the figure will be seen, at its horizontal sector, to be a combination of ridge and step.

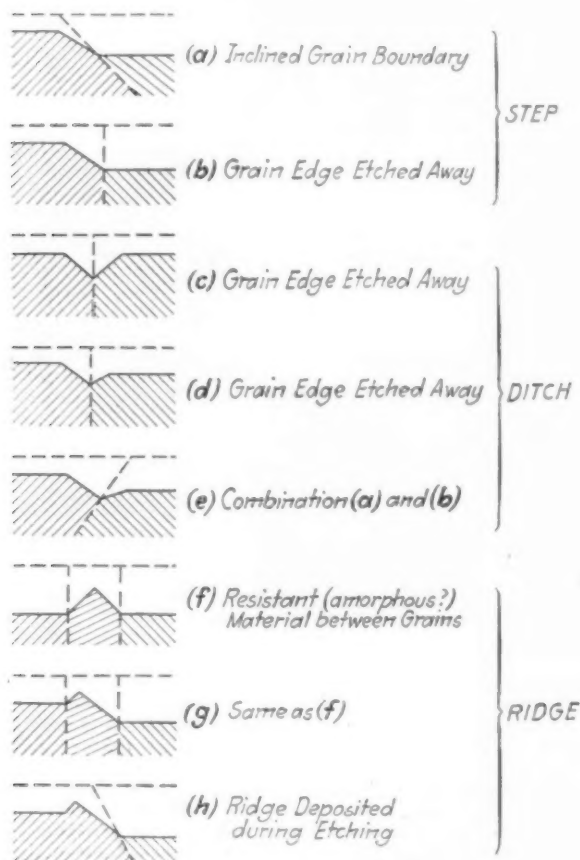


Fig. 12—Diagrams of Types of Grain Boundaries in Ferrite. Horizontal broken lines represent original polished surfaces before etching. Inclined broken lines represent grain boundaries below the surfaces. Solid lines represent the etched surfaces. Hatch lines indicate difference in orientation between adjacent grains

A third type of boundary is seen in Fig. 11 (right-hand and left-hand photomicrographs). The boundary between the central and lower left-hand grains is evidently a ditch, both grains being at the same level.

Fig. 12 depicts various types of grain boundaries observed under conical illumination in very mild steel. An attempt is made by dotted lines to reconstruct the grains, as they were before etching, and to indicate the continuation of boundaries below the surface. The unshaded portions represent metal removed by etching. It is thought that these sketches will be suggestive in themselves of various possibilities in the way of explanation.

Practical advantages of the method suggest themselves continually, not the least of which the writer has found to be the sense of pleasure and lack of fatigue attendant upon its use. Without doubt, this is the consequence of viewing objects in the microscopic field in their natural relationships.

Methods for analyzing molybdenum and various other rare metals have been described by the Bureau of Mines in Bulletin 212, which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, at a price of 40 cents.

### Developments in Hot Process Galvanizing

The coating on an ordinary galvanized sheet consists of several layers and, by reference to the equilibrium of the iron-zinc system, the first layer is found to be one corresponding to the solid solution of the 80 to 100 per cent iron phase, says an article in *Metal Industry* (British), Nov. 2, 1923. At a dipping temperature, the rate of zinc diffusion will be small, but the high iron percentage will make this layer very ductile. The next layer formed will be equivalent to the  $FeZn_5$  compound, and possibly also to the  $FeZn_{10}$  compound and solid solutions of the high zinc proportions. This layer will be very brittle. The third layer is produced on withdrawal from the bath, and its composition will be that of the molten metal in the same. It will likewise be ductile. The article is in part as follows:

The process now in general use in Austria aims at omitting this brittle phase. An illustration shows the type of kettle used, which is almost completely filled with lead, there being only, say,  $1\frac{1}{2}$  in. of spelter on top. Sheets, after pickling and cleaning as usual, are dipped into the molten lead, go through the flux, are passed under the flux-box, and then drawn out through the thin layer of spelter, no further operation being necessary. Very pure lead, free from antimony, should be used, and the best spelter—on no account remelted metal.

Another new process, called "galvannealing," has been brought out for galvanizing wire, which prevents the coating flaking off or stripping when the wire is sharply bent. In the new process, the zinc actually penetrates or is amalgamated with the wire. The zinc is applied much more thickly, and it is almost impossible to break through or peel it off. Instead of having the zinc wiped off on emerging from the pans, the wires are passed through a long heat-treating furnace which keeps the heavy zinc coating molten long enough for it to spread evenly and to penetrate until it becomes part and parcel of the wire. The heat used is a bright cherry-red, at which temperature there is a strong affinity between the two metals.

### Open-Hearth Refractory Materials

In connection with the study of open-hearth refractory materials, being undertaken at the Ceramic Experiment Station of the Bureau of Mines, Columbus, Ohio, experimental work has been started which has as its aim the production of a high alumina refractory using a kaolinitic bauxite as the raw material. There are large deposits of bauxite high in silica, that have found a very limited field of usefulness, which it is hoped can be utilized to produce a less acid refractory than silica and which will at the same time have a higher fusion temperature. When such material is fused or highly sintered, it can be made into a brick which will be practically free from the high shrinkage characteristic of bauxite brick burned at the ordinary kiln temperatures. The mineralogical composition aimed at is a mixture of sillimanite and corundum together with the eutectic formed between these two minerals. It is proposed to prepare the sinter by the method proposed by Lecesne or by whatever modification of it may seem desirable. One modification which has been suggested is the utilization of oxygen-enriched air for the blow toward the end of the burn.

### Request for Unpublished Data

The editorial board of International Critical Tables will appreciate receiving from scientific investigators any numerical data which they are able and willing to furnish, which have not been published prior to Jan. 1, 1924. All data are desired which characterize the behavior of any definite material, substance or system. Data will be included in International Critical Tables, and the source will be indicated by "private communication from, etc." All data should be sent to International Critical Tables, National Research Council, Washington.

# Woodrow Wilson and War Industries

## Full Cooperation of Iron and Steel Manufacturers Secured Without Legislative Control of Production—The Marvelous Work of Various Boards

WASHINGTON, Feb. 5.—The lamented death of Woodrow Wilson recalls vividly the close relationship the war President had with the iron and steel and allied industries during the struggle against the Central Powers. His vast intellectual powers quickly took in and analyzed problems that ordinarily would be outside the thought of one of his training and temperament. Devoted to world peace, he was by no means a pacifist. During the war he urged production relentlessly—production and still more production—and was a tremendous driving force to this end back of the great war machine he had caused to be set up. To Woodrow Wilson all industries were important and the contact he had with them was remarkable. But to say that he had a particularly close acquaintance with the problems of the key industry, iron and steel, is only to state a fact.

### A Leader Among Leaders

It was not unusual to see President Wilson in one of the Government departments or bureaus, appearing unannounced, to confer with their heads or subordinates on the progress that was being made in setting up the war machine. His words were not alone those of command to speed up preparation, but of encouragement, advice and offers of help. At no time did he indicate discouragement, no matter how depressing the problems might be, including those of the iron and steel and cognate industries. The attitude of the war President was one of cheerfulness, frequently shot through with rays of delightful humor and confident smiles. Woodrow Wilson never liked the title of "intellectual machine" which an admirer had given him. He wanted to be known as a human machine as well. His visits among those in war service in Washington and his conferences with industrial leaders during the struggle revealed him in this light to a remarkable degree.

That he had an extraordinary equipment for his great task was manifested constantly from April 2, 1917, the day he appeared before Congress with his war message, until the armistice. He was well aware of the fact that America was pitifully unprepared for the war and faced demands that seemed to be overwhelming. The outstanding problems were the keeping of the allies from starvation by supplying food, assisting the allied armies by great shipments of material, expediting as large fighting forces as possible to France and equipping them with the implements of war. Being without a merchant marine, the United States also had to build a vast fleet of vessels to transport men and supplies along with increasing its naval units vastly. All called for immense quantities of steel.

Coordination between the United States and the associate powers was quickly brought about, conferences held and plans made for exchange of information and materials, much necessary legislation passed, including appropriations and the creation of war organizations, such as the Council of National Defense. Conditions were more or less chaotic, but with a clear vision President Wilson made short work of obstacles. Thanks to the intelligent and devoted work of the Council of National Defense, definite ideas were evolved for the building of a war machine. The War Industries Board, organized for creating facilities for manufacture, opening new sources of raw materials, allocating materials, decreeing priorities, fixing prices and acting as purchasing agent for the allies, became the greatest industrial clearing house that the world has ever known.

The War Industries Board was created on July 28, 1917, by the Council of National Defense and promptly

approved by the President. For its head the President chose Bernard M. Baruch, a man whose name was hardly known to the iron and steel industry, but the great organization he built and the great service he rendered fully justified the selection of the President. This machine was destined to control with absolute power the entire industrial resources of the nation, and without any legislative mandate to name prices and perform its many other functions, in all of its activities having the cheerful cooperation of the industries of the country. The War Industries Board was expected to provide iron and steel to the Allies at the same prices at which they were provided to the United States Government, for on July 12, 1917, President Wilson had declared that there must be a "just price" and that "prices for the Government must be the same as for the public." On the same day, Secretary of War Baker issued a statement saying that the steel men had given assurance that their entire product would be available for the war and that they were doing everything possible to stimulate and increase production and speed deliveries. The price, he said, for iron and steel products was left to be determined after a cost inquiry by the Federal Trade Commission was completed.

Following conferences of steel manufacturers with Mr. Baruch and others, the President on Sept. 24, 1917, issued his first price fixing announcement. This was followed from time to time by other announcements and throughout the war the prices announced by the President were adhered to with patriotic unanimity by iron and steel manufacturers without any compulsion of statute. The history of the manner of reaching the prices, of supplying material, of increasing plant facilities and setting up added war units, the whole-hearted support of manufacturers of iron and steel, is illuminatingly set forth by Grosvenor B. Clarkson in his book, "Industrial America in the World War," which was reviewed in *THE IRON AGE* of Sept. 20, 1923. Mr. Baruch also made public an interesting report, "American Industry in the War" on March 20, 1921, detailing work of the War Industries Board and making recommendations for industrial preparedness.

### Cooperation of Iron and Steel Leaders

Many prominent men were associated with the War Industries Board. All iron and steel producers were in contact with it in one way or another. Chairman Elbert H. Gary of the United States Steel Corporation headed a committee of the American Iron and Steel Institute which worked with the board. The Director of Steel Supplies of the board was J. Leonard Replogle. The price fixing committee was headed by a man outside the steel industry, Robert S. Brookings of St. Louis. To name all iron and steel men who worked with the board and lent their utmost efforts to production would mean almost the naming of the entire list in the industry. The selections made from the iron and steel industry showed the great confidence President Wilson had in its representatives. His appointment of Chairman Charles M. Schwab of the Bethlehem Steel Corporation to head the Emergency Fleet Corporation was further proof of the discernment of President Wilson in selecting big men to perform big tasks, and he was free to pay tribute to them and their work.

### No Steel Price Legislation

The quick acquiescence of steel manufacturers in what the Government authorities did, even if the policies did not accord entirely with their personal

views, was always in evidence. There was no quibbling. All had in view the common end—the winning of the war. The thorough support given the President made unnecessary the enactment of legislation, though bills were proposed looking to the control of prices of steel. Coke and coal were under legislative control through the Lever act but coke and coal interests were so regulated because of the general public use of these products, along with food. The railroads also were taken over by the Government because of their public service and the need to mobilize them on war lines. Their problems were many. They had become congested; movement of steel and other essential war products was halted at times. But at length, with the cooperation of the Government authorities and industrial interests, they worked efficiently. Thus, when the Armistice came, the nation had begun to show its potentialities as a huge war machine, though never were these possibilities completely measured.

Mr. Baruch, in his report, said that in steel the result of price fixing was to reduce ship plates from \$12 to \$3.25 per 100 lb.; pig iron from \$60 to \$33 per ton; coke from \$12.75 to \$6; copper from 37c. to 16.67c., 23.5c. and 26c., and zinc from 22.50c. to 12c. The accuracy of Mr. Baruch's higher figures may be challenged so far as concerns their applying to any considerable tonnage, but it is fair to say that price fixing by agreement with the iron and steel manufacturers' committee represented a saving of hundreds of millions of dollars, when comparison is made with prices prevailing in the open market previous to Sept. 24, 1917.

#### A Marvelous Performance

Figures of production are an impressive reminder of the cooperation of the steel industry. While, due to fuel shortage, production of pig iron declined from 39,435,000 tons in 1916 to 38,650,000 tons in 1917, production of steel ingots and castings was the greatest on record, running close to 45,000,000 tons, compared with 42,773,680 tons in 1916.

The enormous demands made for steel for ships, munitions, cars and locomotives, and many other chan-

nels of consumption were strikingly shown when Mr. Replogle told the American Iron and Steel Institute at its meeting in New York in June, 1918, that the War Industries Board then had unfilled orders on the books of steel manufacturers and in Washington for 16,800,000 tons of steel for the United States and allied Governments. Yet despite methods of conservation adopted by the board, steel and more steel was in demand and the problem at times was extremely perplexing. The demand rose until in the middle of August, 1918, it was 23,000,000 tons. Iron and steel units were added, especially plate mills and ordnance plants, and the industry, responding to the ever urgent appeal for more steel, had considerably augmented its output, and was producing in huge tonnages when the Armistice came.

Prior to 1914, says Benedict Crowell, assistant to the Secretary of War and director of munitions, in "America's Munitions," there were but six Government arsenals and two large private ordnance works which knew anything about the production of heavy weapons. After 1914 war industry sprang up in the United States, yet in 1917 there were only a score or so of firms engaged in the manufacture of artillery ammunition, big guns, rifles, machine guns and other important ordnance supplies for the Allies. When the Armistice was signed nearly 8000 manufacturing plants in the United States were working on ordnance contracts. In the 19 months of war American factories, he says, produced over 2,879,000,000 rounds of rifle and machine-gun ammunition. Prior to Nov. 11, 1918, America produced in the 75-mm. size gun alone about 4,250,000 high-explosive shells, over 500,000 gas shells and over 7,250,000 shrapnel. At the request of President Wilson through the War Department, the United States Steel Corporation was erecting on Neville Island without profit to itself an ordnance plant which would have produced weapons of the character of those used with railroad mounts and would have turned them out in large numbers had not the Armistice come to put an end to the immense enterprise. Ultimately it would have involved an expenditure of \$150,000,000.

## Steel Treaters' Fifth Sectional Meeting

### Tool Steel Problems, X-Ray Analysis and Scientific Control of Production Discussed at Rochester Last Week

FIVE sectional meetings have been conducted by the American Society for Steel Treating. The most successful one was held last week under the auspices of the Rochester chapter at the Seneca Hotel, Rochester, N. Y., Jan. 31 and Feb. 1. It was characterized by the largest attendance of any of the previous sectional meetings and was featured by an unusually high grade program of technical papers. Nearly 150 members and guests were registered, the preponderance being representatives of chapters in New England, New York, Pennsylvania, Ohio and other sections. The object of these sectional meetings, which is to bring together the membership of chapters in certain parts of the country for the discussion of various subjects, and the promotion of a better acquaintance, was fully realized at the Rochester meeting.

The first day was devoted to technical papers and the second day to plant visitations. After the usual registration on the morning of the first day, the first technical session was called to order by J. J. Desmond, chairman of the Rochester chapter, who extended a brief welcome to the visiting members and then introduced Edwin F. Cone of THE IRON AGE as chairman of the meeting.

#### Carbon and High-Speed Tool Steels

The first paper was presented by A. H. d'Arcambal, chief metallurgist, Pratt & Whitney Co., Hartford, Conn., who discussed "Some Carbon and High-Speed Steels Used in the Manufacture of Small Tools." The

speaker had a large assortment of specimens to illustrate his address, which was largely from notes. It discussed in general the importance of metallurgical control in the manufacture of such steels. After a general presentation of the importance of chemical and physical tests and the value of keeping individual records of each grade of steel and of each type of tool in its heat treatment in a plant such as his own, the speaker suggested that, in addition to this, visits to the steel mills where the steel is produced are often advisable.

Mr. d'Arcambal referred to the poor quality of tool steel made during the war in open-hearth furnaces and then dwelt upon the subject of electric and crucible steel for the manufacture of tool steel, stating his decided preference for the electric process as insuring proper temperature control, as well as close chemical regulation, adding that by contrast the crucible process was more liable to vary in chemical results. His address was divided into two parts covering, first, carbon steel and, later, high-speed steel. He dwelt upon the importance of not hammering or forging carbon steel at too high a temperature, and then described some of the various types of carbon and semi-high-speed tool steels, passing around the audience samples of some of these and giving various illustrations of good and bad heat treatment.

In discussing the various types of carbon steel the speaker mentioned six, those containing 1.10 to 1.25 per cent carbon, those containing 0.90 to 1 per cent

carbon, and then those having small percentages of chromium, others having chromium and tungsten in small proportions, as well as some types, mostly semi-high-speed, having silicon, chromium, vanadium, molybdenum, and possibly other elements each not exceeding 1 per cent.

#### Electric Hardening Room a Possibility

The speaker discussed the hardening, quenching and tempering of these various steels, dealing with both the open-fire and the bath method of heating, asserting that one method might be better than another in particular cases, but expressing his preference for the electric process wherever possible. He made the significant remark that he believed that within three years it will be possible to equip a modern hardening room with electric heating equipment exclusively, and he unqualifiedly approved such an aim.

Under high-speed steels, Mr. d'Arcambal discussed the 18 and 14 per cent tungsten varieties, calling attention to the fact that the 18 per cent has a wider range of hardening with less liability of a coarsening of the grain. He dwelt rather briefly on cobalt steels containing 3.50 per cent cobalt, and also on those containing molybdenum, uranium, etc., as being more sales propositions than really high-grade steels. In all high-speed steel he insisted that carbon was the most important element and that for the best cutting efficiency a carbon range of 0.65 to 0.75 per cent was preferable.

Dealing with the hardening of high-speed steel, the speaker described the salt bath, the pack hardening, and the open-fire methods, dwelling upon the advantages of the last where proper equipment could be obtained. He referred to the Ryan electric high-speed steel treating furnace (described in *THE IRON AGE*, Jan. 24) as a new development and one of considerable interest because of the high temperature obtainable and urged those present to inspect this furnace at the Gleason Works in Rochester the following day. In general, he stated that a high-speed tool may be considered as properly hardened if it is file hard on a ground surface after drawing at 1100 deg.

A few miscellaneous questions were answered by the speaker, but sufficient time for adequate discussion of the paper was not available.

#### Structure of Metals

The second paper of the morning session was entitled "Structure of Metals," by Prof. O. W. Ellis, University of Toronto, Toronto, Can., which was presented in abstract by R. M. Bayliss, editor of the *Transactions* of the society. The paper was a highly technical discussion and presented the author's colloidal theory as contrasted with the amorphous and other theories.

The paper was briefly discussed by S. L. Hoyt, metallurgical engineer, research laboratory, General Electric Co., Schenectady, N. Y., and by Dr. Zay Jeffries, research bureau, Aluminum Co. of America, Cleveland. Both of these speakers took considerable exception to Prof. Ellis's colloidal theory, characterizing it as highly speculative and not based upon as many facts as some other theories which the speakers manifestly have preference for.

Five papers were presented at the afternoon session, most of them being informal addresses, illustrated by slides and specimens. The session was turned over by the chairman of the Rochester chapter to A. W. H. Green, Philadelphia chapter, chief metallurgist Illingsworth Steel Co., Philadelphia.

#### Scientific Control of Production

"Control of Production by Scientific Methods" was the title of the first address delivered by Prof. H. M. Boylston, department of metallurgy, Case School of Applied Science, Cleveland. The address was of a general nature, illustrated by slides, and dealt with some of the modern methods of scientific control as applied to the production and heat treatment of steel, his object being to present a general picture. Going back to the earliest days and alluding to Tubal Cain, as the first iron metallurgist and heat treater of steel, he traced the development down to the present time,

stating that now the purpose of all investigation was the improvement of the product combined with a reduction of waste.

Professor Boylston divided his subject into five parts, discussing control by heat treatment, control by chemistry, control by physical testing, control by structure, and the inspection of raw materials. He dealt largely with the various processes and instruments used under the various heads referred to, throwing on the screen pictures of modern apparatus of all kinds.

In the brief discussion which followed, allusion was made to X-ray analysis and to some recent developments in metallography, such as the possibility of unusually high power magnification and the use of conical illumination.

#### Magnetic Testing as a Means of Control

A brief description of some of the recent work of Dr. C. H. Burrows was presented by Edwin F. Cone, New York chapter, who stated that recently he had had the good fortune to be present, with a group of invited guests at the laboratory of Dr. Burrows in Jersey City, where a demonstration was given of some of the recent results obtained, after several years' investigation, as to the application of magnetic analysis to the heat treatment of steel, and also some of the further refinements of apparatus perfected by Dr. Burrows in the testing of the homogeneity of steel. The details of the description referred to are given elsewhere in this issue of *THE IRON AGE*. If the claims of Dr. Burrows, that the magnetic testing of steel as applied to heat treatment has been put upon a commercial basis, are borne out, the speaker pointed out that it is an important step in advance not only as applied to the scientific control of heat treatment, but of production as well.

#### X-Ray Analysis of Steel

Taking as his subject "X-rays and Steel," Dr. Ancel St. John, Research Laboratories Union Carbide & Carbon Co., Long Island City, N. Y., delivered an interesting address on various phases of this subject. He stated that his present lecture was really an elaboration of the two articles on the same subject which appeared in *THE IRON AGE* of Sept. 27 and Oct. 4.

The speaker illustrated his discussion with various models of different crystals, and also had in operation a small X-ray machine with which he demonstrated the application of X-rays to the examination of iron, aluminum and other metals. He also discussed, with the aid of lantern slides, the work of the Watertown Arsenal in perfecting its foundry practice by means of the X-ray examination of steel castings and also delivered a somewhat elaborate explanation of the application of the X-ray to crystal analysis, fully illustrating this with lantern slides.

Dr. St. John expressed the opinion that he believed that some day the X-ray will be not only a method of control in metallurgical operations, but available on a commercial scale for the examination of steel.

#### Annealing of Tool Steel

The third paper of the afternoon was read in abstract by J. V. Emmons, chief metallurgist, Cleveland Twist Drill Co., Cleveland, Ohio, who took as his subject the "Annealing of Tool Steel." The speaker discussed somewhat minutely some of the more important phases of this subject, dealing largely with carbon tool steel containing from 0.60 to 1.50 per cent carbon. He discussed some of the various factors, having to do with the machinability and hardening of steel as affected by heat treatment, as well as the refinement of the grain. He stated that annealing depends upon the condition the steel is in before being subjected to that process, but that it is safely conducted if done just above the critical point. Among the interesting points which he brought out was the fact that graphite in high carbon tool steels has now practically disappeared, whereas a few years ago it was not unusual to find considerable present after heat treatment. One cause of this change was the presence of small amounts of chromium in many of the carbon steels, introduced either purposely or as a constituent of the scrap or pig

iron used. In fact, plain carbon tool steel with no chromium is now rare.

#### Motor Pinions and Photoelastic Analysis

The session concluded with the presentation of two brief addresses, one on the photoelastic method of analysis as applied to the design of railroad motor pinions, delivered by A. L. Kimball, and the other, the properties of railroad motor pinions, presented by G. R. Brophy, both with the research laboratory of the General Electric Co., Schenectady, N. Y.

Mr. Kimball by means of lantern slides described an apparatus which uses refracted light which, when applied in special apparatus and special material, brings out in the form of various colored bands of light the stress strains which may be expected in the design of certain products, such as motor pinions when made from a model. Mr. Brophy's address was the demonstration of some of the foregoing results of photoelastic analysis, as shown by the fracture of the teeth from certain railroad motor pinions. The fractures plainly indicated that the lines of strain in the steel were in nearly the same general location as shown by the photoelastic representation of the material used in the original models.

#### Banquet and Plant Visitation

By invitation of the Rochester Chamber of Commerce, the convention united with that body in an informal banquet Thursday evening, held in the chamber's own building. It had originally been intended that Dr. George K. Burgess, national president of the society and the director of Bureau of Standards, would be the chief speaker, but it was impossible for him to leave Washington. In his place Ray M. Hudson, assistant chief division of simplified practice of the Department of Commerce, delivered an interesting address on "Simplification and Standardization." In the absence of Dr. Rush Rhees, president University of Rochester, originally scheduled as toastmaster, S. M. Havens of Chicago, a director of the society and assistant manager Wyman-Gordon Co., officiated in his place. There were brief addresses by James E. Gleason, president Gleason Works, Rochester, representing the Chamber of Commerce, and by Arthur S. Gale, professor of mathematics and dean of the University of Rochester.

Plant visitation occupied the larger part of the second day, Friday, Feb. 1, when about 50 visiting members were escorted through the plants of the Gleason Works, the Taylor Instrument Co., Bausch & Lomb Optical Co., where luncheon was served, and the research laboratory of the Eastman Kodak Co.

It is understood that the next sectional meeting will probably be held under the auspices of one of the chapters in Illinois or Minnesota.

The corporate name of Milwaukee Rolling Mill Co., Milwaukee, recently purchased by Inland Steel Co., Chicago, has been changed to Inland Steel Co. of Wisconsin. Officers have been elected as follows: Chairman, P. D. Block, who is president Inland Steel Co., Chicago; president, C. A. Irwin; vice-president, in charge of sales, Edward M. Adams; vice-president, C. M. Easterly; secretary-treasurer, W. D. Truesdale; works superintendent, Boyd B. Jack. Messrs. Irwin and Jack held the same positions in the old organization.

New guards for 25 and 50-watt mill type lamps, made of expanded steel, reinforced and tinned, have been placed on the market by the Flexible Steel Lacing Co., 4607 Lexington Street, Chicago. Key locking and non-locking styles are available.

A pamphlet on trademarks, trade names and unfair competition has been prepared for general distribution by William C. Linton and a copy may undoubtedly be obtained by addressing Mr. Linton at 918 F Street, N. W., Washington.

### Appointee to Federal Trade Commission May Not Be Confirmed

WASHINGTON, Feb. 5.—The sensational Teapot Dome Oil investigation has become of such great magnitude as to confine the activities of the Senate to that one subject almost exclusively. Because of this it has resulted in delay in acting on the appointment by President Coolidge of George B. Christian to succeed Victor Murdock as a member of the Federal Trade Commission. Mr. Murdock, who recently resigned to resume editorial work on his paper, the *Wichita Eagle*, Wichita, Kas., gave up his official duties with the commission on Feb. 1. There promises to be a lively fight in the Senate over the confirmation of the appointment.

Mr. Christian, intimate friend of and former secretary to the late Warren G. Harding, when the latter was Senator and President of the United States, is looked upon by progressives in the Senate as being a conservative. Because of this his confirmation will meet with opposition, but friends of Mr. Christian express confidence that in the end he will be confirmed.

The appointment of Mr. Christian would mean that he would take part in considering cases of great interest to the iron and steel and related industries. The outstanding case of this kind is the Pittsburgh plus proceedings. When the original vote was taken in this case, Commissioners Gaskill, Murdock and Colver voted against the issuance of the complaint. Subsequently, Mr. Colver was succeeded by Commissioner Nugent, who voted for a complaint, which was issued by a vote of three to two. Mr. Murdock and Mr. Gaskill again voted against the issuance of a complaint. Since that time Commissioner VanFleet has taken up his duties on the commission, and, while it is not known what his position in the Pittsburgh base case is, if he and Mr. Christian should be opposed to a cease and desist order, and if Mr. Gaskill has not changed his position, this would mean dismissal of the proceedings inasmuch as a majority would vote for such action.

### Metal Finishers' Exposition

The Metal Finishers' Exposition, held in Dayton, Ohio, last year, will be repeated this year on a larger scale, April 14 to 19, inclusive. The purposes of the Exposition are to acquaint the buying public with the various phases of the metal finishing business necessary to produce decorative and protective finishes and to acquaint the manufacturer and dealer of these products with the materials, processes and equipment necessary.

The exhibition will be held under the auspices of the Dayton branch of the American Electroplaters' Society. M. G. Kopf, chairman of the executive committee, 612 Schwind Building, Dayton, is director of the exposition.

The Southern Railway is developing its Finley yards at North Birmingham, Ala., and specifications are out for 2000 tons of structural steel for a car shop and locomotive erecting shop. Dwight C. Robertson & Co. of New York have the contract for much of the construction. Cement in quantity is being purchased in the Birmingham district, and from 75,000 to 80,000 bbl. will be used. The car shops will do some of the work that was done at the Gadsden car works which were destroyed by fire a few months ago.

The Chicago Foundrymen's Club will hold its regular monthly dinner-meeting at the City Club, Chicago, Saturday evening, Feb. 9. The program calls for a round table discussion in which the members themselves will participate, relating pertinent incidents from their own foundry experiences.

The New York Central Railroad plans the elimination of thirteen grade crossings through the city of South Bend, Ind. The project will entail an outlay of over \$1,000,000 and considerable structural steel will be required.

### LeBlond 17-Inch Lathe

The R. K. LeBlond Machine Tool Co., Cincinnati, has added to its line the 17-in. heavy-duty rapid production lathe illustrated, which among other features is provided with a six-speed selective geared headstock, intended to adapt the machine to the heavier phases of plain turning and facing work.

The spindle speeds range from 50 to 250 r.p.m. and changes of speed may be made selectively without the necessity of going through intermediate speeds. The entire range of spindle speeds is obtained by the manipulation of two levers. The driving pulley is 14 in. in diameter, the driving belt 4 in. wide and the pulley speed 500 r.p.m. The driving pulley runs on an oil bush to relieve the drive shaft of belt pull, and is clutched to the shaft by an automobile-type multiple-disk clutch which runs in oil. The clutch is operated by the lever at the front of the headstock.

The headstock is of the flooded lubrication type, being filled with oil to a level indicated on the front. Gears are of chrome-nickel alloy steel, heat treated and hardened. They have stub form teeth and are rounded. The sliding gears are mounted on short high-carbon steel shafts with six hobbled splines, the corresponding keys in the gears being broached from the solid. The spindle is large and is a high-carbon crucible steel forging. Spindle boxes are tapered and are adjustable. End thrust is taken against ball bearings.

The apron is of the company's patented construction. A positive jaw feed clutch controls both the longitudinal and transverse feeds. Gears are drop forgings, heat treated, and the rack pinion has four keys milled integral, the rack gear having multiple broached keyways. The bed is of the company's heavy duty design and the improved compensating vee is incorporated.

Nine changes of feed, from 0.010 to 0.123 in. per revolution of the spindle, are obtainable with the use of two change levers, the bottom lever compounding the range obtainable with the top lever. The gears of chrome-nickel alloy steel, hardened, and shafts are short, the sliding gear shafts are multiple splined. The mechanism is driven from the spindle by a roller chain, the drive being completely inclosed.

Constant speed belted motor drive with the motor carried in the base of the head end cabinet leg, is available. A 5-hp. 1200-r.p.m. motor is recommended. The swing over the shears is 18¼ in. and over the carriage 12½ in. Work up to 2 ft. 9 in. long may be held between centers on the lathe with 6 ft. bed. The shipping weight of the machine with 6 ft. bed is 2300 lb.

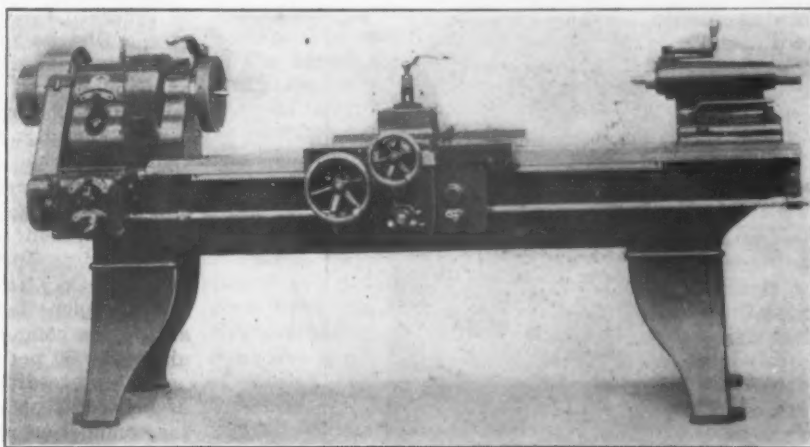
Officials of the Pawling & Harnischfeger Co., Milwaukee, tendered a banquet to 250 employees who have credit for five years or more of continuous service, and presented each with a gold service pin, each of special design to fit the term of service. The emblems for men in the 25-year and 30-year class were embellished with a diamond. Plans were laid for a permanent organization of veteran employees. Speakers at the dinner were Henry Harnischfeger, president; Arthur G. Henricks, vice-president and general manager; Rene V. Schleinitz, secretary, and M. J. Yocum, who recently retired as secretary.

The first haulage electrification of an open-pit iron mine in America will be made with the installation of three 60-ton electric locomotives recently purchased by the M. A. Hanna Co. from the General Electric Co. Each locomotive will be equipped with an auxiliary cable reel to be used when temporary track extensions are made beyond the third rail.

### Decision as to Rates on Plates

WASHINGTON, Feb. 4.—Rates charged on steel plates in carloads from Eastern points to Portland, Ore., between Feb. 26 and Aug. 18, 1920, were not applicable, the Interstate Commerce Commission held in a decision last week in passing upon the case of the Willamette Iron & Steel Works and others vs. Director General, et al. Reparation was awarded. It is to be made up of the differences between the charges collected and those that would have accrued had the proper rates applicable to ship plates been applied. Lower rates applied on ship plates than on plates of similar gage and transportation characteristics. In assessing the lower ship plate rates, the railroads looked for a certificate from some ship qualification bureaus proving that the plates were for use in the hull of the ship or suitable for that purpose.

The decision pointed out that the only difference between ship plates and ordinary plates of No. 11 gage,



A Six-Speed Selective Geared Headstock Is Intended to Adapt the Machine to the Heavier Phases of Plain Turning and Facing Work. The swing over the shears is 18¼ in.

or heavier, was that produced by the degree of heat in the ingot when the rolling took place. Lower rates were made on ship plates than on other kinds of plates in the war period, to expedite construction of ships on the Pacific Coast.

The plates were No. 11 gage or heavier. Commodity rates of \$1.375 applied from Claymont, Pa., \$1.315 from Johnstown and \$1.25 from Pittsburgh. Rates of \$1.10, \$1.065 and \$1 applied on "plates, ship, in connection with a minimum of 80,000 lb." The higher rates were applied on the plates shipped to the complainant. Most of its steel was of grades more expensive than ship plates. More than half of the steel, however, was either ship plates, or marine steel. Some of it was used in repairing steel vessels. The commission said that the record left no doubt about the intention of the defendants to limit the lower rates to ship plates. But it said that that intention could not control the application of the tariff naming lower rates on ship plates than on plates of the same thickness used for other purposes.

### New Records on Silvery Iron

Jisco Furnace of the Jackson Iron & Steel Co., Jackson, Ohio, has been breaking records. Saturday, Jan. 26, it made 197 tons and on Sunday, Jan. 27, it made 199 tons. This is considered the largest tonnage ever made on silvery iron anywhere in one day. The furnace blew in Thanksgiving day last year, after being down three months for relining, improvements and repairs. A new water system, a Berg mud gun and a Dovel pig iron breaker were included in the improvements. The furnace has a 13-ft. hearth with 8 tuyères, is 75 ft. high with an 8-ft. bell and 12-ft. stock line. In all, \$125,000 was spent. H. R. Shick, formerly blast furnace superintendent, Cambria Steel Co. and Pittsburgh Steel Co., is the general superintendent.

### Improves Design of Hardening Machine

A hardening machine adapted particularly to large bevel gears, spur and internal gears up to 25 in. in outside diameter, but which may be used on a variety of work that has a tendency to warp when hardened in the usual way, is shown in the accompanying illustration. The machine which is being marketed by Gleason Works, Rochester, is similar to the equipment described in detail in THE IRON AGE of June 18, 1914.



Hardening Press for Bevel, Spur and Internal Gears

Air is used exclusively to control the action of the machine. Two air cylinders, upper and lower, are employed. In hardening a gear, the pilot end of a plunger on the upper piston enters a split centering bushing, bringing the bore to approximately correct central position. A taper sleeve or expander on the plunger enters the taper bore in the split centering bushing and spreads it to fit the bore of the gear when it is expanded by heat, thus assuring correct centering. Air applied at the back of the expander exerts pressure on the centering bushing, preventing the bore of the gear from going "out of round."

The die on the upper piston comes down to bear on the face of the gear and web to hold it from warping "out of plane." The pressure in the upper air cylinder increases until it exceeds the pressure acting against the lower die holder piston. The gear is then forced under the oil and the pressure is maintained until it is cold, the gear being held central and round while contracting.

Both the upper and lower die plates are cored out and provided with grooves in the surface to permit free circulation of oil. It is said that the gear comes out uniformly hard and, with dies arranged to provide a forced oil circulation, the teeth are harder than when hardened in an open tank.

The upper die movement is controlled by a four-way valve, while full line air pressure is at all times acting on the piston supporting the lower die holder. The taper expander is under air pressure controlled by a reducing pressure valve which may be regulated from 1 lb. to full line air pressure. With an air line pressure of 100 lb. per sq. in. the gear is subjected to 8000 lb. pressure to hold it plane at submersion.

The capacity of the machine ranges from 10 to 30 gears an hour. Pipe connections are provided to get circulation from an outside reservoir or cooling system. A compressor supplying from 20 to 25 cu. ft. per min. of free air, with a storage tank of not less than 30 cu. ft. capacity is considered ample for the machine. Air pressure of 80 to 90 lb. is recommended.

It is necessary to have the gears turned true and interchangeable in face angles and backs to correspond with the standard dies. The oil circulated through the machine to absorb the heat varies from 11 to 30 gals. per min., depending upon the inlet and outlet temperature of the oil. The size of the storage tank is determined by the inlet oil temperature desired, and whether artificial cooling is employed.

### Important Decision as to Disclosing Costs Is Expected

WASHINGTON, Feb. 5—Early decision is expected to be rendered by Justice Siddons of the Supreme Court of the District of Columbia in the case instituted by the Norwegian Nitrogen Products Co., seeking a writ of mandamus to compel the United States Tariff Commission to disclose all information in its files concerning the investigation of the sodium nitrate duty which the commission has under way. Arguments were closed in the case last week in which Judge DeVries appeared for the petitioners who are seeking to force the commission to disclose information which it has regarding production costs of the American Nitrogen Products Co. The latter some time ago filed an application under the flexible provision of the tariff act asking the commission to increase the duty on sodium nitrite by 50 per cent.

The proceedings have been given special importance as being the opening of a test as to the authority of the commission under the flexible provisions as well as to the legality of the provisions themselves. It is believed that the case will be carried through the Supreme Court of the United States.

Judge DeVries argued that the petitioners are entitled, under the flexible provisions, to see all the data gathered by the commission as it affects the American Nitrogen Products Co., while Vice-Chairman Culbertson and Commissioner Glassie declare that the proposal of the petitioners was preposterous. Commissioner Glassie said that the commission considers itself bound by law and principle not to disclose anything in the nature of competitive information or any other data which would tend to give one firm unfair knowledge of the business of a competitor. He declared that costs of production and similar material are considered by the commission in the nature of competitive information which cannot be disclosed except in the form of a summary such as is used by the commission.

### Anti-Corrosive Solution

An anti-corrosive solution known as the Gardco, intended to prevent the rusting of iron, steel and zinc, is being marketed by Lockwood, Eslick & Pfohl, Buffalo. It is claimed that the solution, in addition to being rust preventing, resists the action of acid fumes, alkalis and brines; will not blister under heat; and is unaffected by moisture.

The solution has the appearance of an enamel or paint, has the consistency of varnish, and after it has been applied to a surface, becomes tough and hard. Various colors are available. Black hardens with a high gloss and other colors with a medium gloss. The viscosity of the solution being practically constant, it is said to be applied with equal facility in hot or cold weather. The solution may be applied by spraying, dipping, or with a brush.

The surface is said to harden by air drying and with proper ventilation the hardening will take place within a few hours. The hardening from surface of metal to surface of solution is said to be a chemical hardening and not a drying process. The solution does not become dry enough to chip or curl.

## CAMPAIGN FOR CLEAN COAL

### Southern Ohio Pig Iron Manufacturers Consider Methods of Sampling and Classifying

The Southern Ohio Pig Iron and Coke Association met at the Gibson Hotel, Cincinnati, the afternoon and evening of Jan. 29. The association had as its guests the members of the Ohio section, Association of Mining and Metallurgical Engineers, and the members of both organizations were guests at dinner of the Cincinnati Coal Exchange, members of which also attended the sessions during the afternoon and evening.

The meeting of the association was called primarily to discuss the coal situation, with particular reference to the association's campaign for clean coal, inaugurated at its midsummer session last year. From reports much progress has been made in the campaign and the meeting was called to devise ways and means to put the industry, in so far at least, as the blast furnace operators are concerned, on a better basis with regard to the quality of coal supplied.

The discussion was brought up under the heading of "The Adaptation of the Methods and Customs of the Iron Ore Business to the Coal Trade," and centered about how best to bring this about, and a committee was appointed to go into the question in detail and report at the next meeting.

In regard to sampling of coal, C. B. Murray, Cleveland, described some methods tried and in use at the present time. He believed that the best samples of coal could be secured either at the point of loading or unloading. In his opinion it was not practical to take a 1000-lb. sample from each car.

T. F. Hindman, Pittsburgh Testing Laboratories, Cleveland, gave it as his opinion that proper samples of coal could only be taken at the point of loading or unloading. In his opinion 1000 lb. to every 500 tons would be a fair sample, and for a single car 200 lb. would be sufficient.

Prof. D. J. Demarest, Ohio State University, described the methods used at the university, where sampling is done when cars are partly unloaded. Before much can be done on inspection, the allowable error in analysis must be determined. In his opinion the errors in sampling coal were many times greater than the errors in analysis.

Prof. H. E. Nold, Ohio State University, stated that channel sampling was better for the coal operator than for the buyer. The best place to sample coals was at the point of loading or unloading.

H. A. Jepson, superintendent of mines at the American Rolling Mill Co., described the method in operation at his company's mines. The coal is sampled as it is unloaded from mine cars to railroad cars. Approximately 25 per cent of the coal is sampled and inspected. The samplers are also inspectors, and after having a special course of training, are able by a visual inspection to estimate the analysis of the coal, which checks very closely with laboratory analysis. In addition the mines of the company are sampled. The securing of clean coal is a matter of education of miners. Through its method the company reduces the average ash content of coal shipped from 9 to 6 per cent. Another question that must be determined is what is impurity in coal.

#### American Rolling Mill Classification

President R. H. Sweetser discussed the practicability of making classifications of coals such as is done in iron ore. The question, he thought, was one of grading, and he gave to the meeting coal classifications adopted recently for use by the American Rolling Mill Co., but which have not been in operation long enough to determine whether they were satisfactory. These classifications are:

Grade A coal—Maximum ash, 6 per cent; maximum sulphur, 1 per cent; for use in gas producers.

Grade B coal—Ash, 6.01 to 8 per cent; sulphur, 1 to 1.50 per cent; for certain other producer gas.

Grade C coal—Ash, 8.01 to 10 per cent; sulphur, 1.50 to 2 per cent; for boiler plant.

Grade D coal—Over 1 per cent ash and over 2 per cent sulphur; use not specified.

Methods of classification were discussed at length, it being the general opinion that various groups of industry could make coal specifications to meet their own particular needs. However, in order to get the matter under way, the association appointed a committee to take up the question of grading coal according to uses, this committee, headed by W. W. Stevenson, Semet-Solvay Co., Detroit, to report at next meeting.

#### Results of Eight-Hour Day

President Sweetser brought up the question of the 8-hr. day at blast furnaces in connection with the workman's compensation act in the State of Ohio. In his opinion the reduction of hours meant a corresponding reduction in the hazard, and by way of proving the statement, he said that since the 8-hr. day was installed at furnaces, the number of lost time accidents had been materially reduced. Plans are now in progress looking toward the readjustment of rates, based on the experiences of the past five years. A committee was appointed to investigate the experiences of the members of the association, particularly with regard to hazard and rates, as affected by the 3-shift plan, and present them to the Ohio Industrial Commission.

### W. L. Saunders Heads Engineering Society

William L. Saunders, chairman of the board, Ingersoll-Rand Co., New York, chairman Naval Consulting Board and deputy chairman Federal Reserve Bank of New York, has been elected president of the United Engineering Society, succeeding J. Vipond Davies. Mr. Saunders is a past president of the American Institute of Mining and Metallurgical Engineers, New York Chamber of Commerce, and American Manufacturers Export Association. He is a member of the American Iron and Steel Institute, American Society of Civil Engineers, and American Society of Mechanical Engineers.

The total membership of the four founder societies which compose the United Engineering Society is 54,224. Membership of the associate societies aggregates 25,615.

George H. Pegram, chief engineer Interborough Rapid Transit Co., New York, and past president of the American Society of Civil Engineers, was chosen first vice-president. J. V. W. Reynders, for several years connected with the Pennsylvania Steel Co., and vice-president American Institute of Mining and Metallurgical Engineers, was named second vice-president. Other officers elected are: Alfred D. Flinn, secretary; Joseph Struthers, treasurer; Henry A. Lardner, assistant treasurer. New members of the board of trustees include Lewis D. Rights, vice-president Shoemaker Bridge Co., New York; James H. Herron, consulting engineer, Cleveland, and H. H. Barnes, Jr., assistant district manager General Electric Co. New York.

### New American Museum of Safety

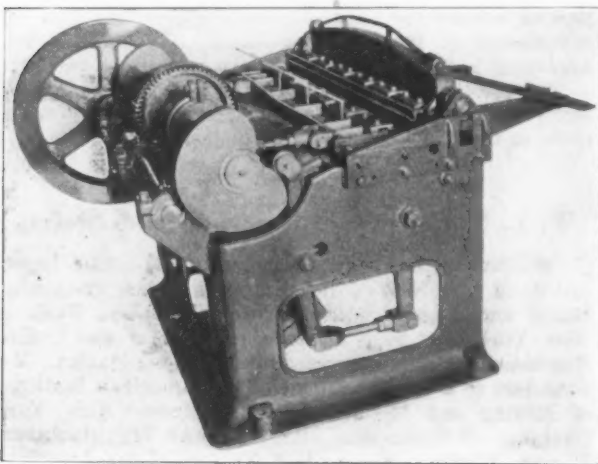
The new American Museum of Safety at 120 East Twenty-eighth Street, New York, was opened on Jan. 15 with the pioneers of the safety movement, captains of industry and State officials present. Scores of people passed through the museum on the opening day to inspect the numerous devices being used in industrial plants, mines, public utilities and on railroads throughout the country for prevention of accidents. At a meeting held before the opening, Arthur Williams, president of the museum, announced that \$50,000 which had been donated as a nucleus for a building fund, has been appropriated for the maintenance of the present museum until a new building can be erected. He also said that the *Scientific American* will offer the gold medal again this year which, until closing the old museum in 1920, had been awarded annually for the best safety device exhibited there. The Louis Livingston Seaman medal will be offered by the museum this year for the best work in industrial sanitation.

### Hinge-Forming Machine for Large Work

A hinge-forming machine or brake of the bulldozer type built for handling large work and heavy material has been brought out by the Yoder Co., Cleveland.

The machine is designed particularly for forming hinges on automobile hoods and will handle sheets up to 50 in. in length. It will form hinges up to ½ in. in diameter and with any width notch from 18 gage and lighter steel. It can also be used for rolling the bottom edges of hood side panels. The hinge is formed by two consecutive operations without changing the dies, and the machine is said to be rapid and positive in its operation. The dies are reversible so that two sizes of hinges can be formed on the same dies.

The general construction of the machine may be noted from the illustration. The base or frame is of one piece and all bearings are cast integral with the frame, a construction intended to provide maximum



Hinge-Forming Machine or Brake for Handling Large Work and Heavy Material. The machine is particularly adapted for forming hinges on automobiles

rigidity. A heavy fly wheel pulley, 36 x 4 in., provides power to care for the intermittent load. A positive stop and control is provided, control being by foot treadle. Provision is made for necessary adjustments of working parts.

Either belt or direct motor drive may be employed. The principal specifications are: Length, 76 in.; width, 70 in.; height, 41 in.; height of working table, 32 in.; speed of pulley, 150 r.p.m., and net weight, 4000 lb. Three horsepower is required to operate the machine.

### Hearing in Bethlehem-Midvale Steel Merger Case Continues

Chester A. Wales, Commissioner of Supply of Troy, N. Y., formerly purchasing agent of the Federal Signal Co., testifying in the Federal Trade Commission hearing in the Bethlehem-Midvale steel merger case, being held at the Federal Building, Broadway and Park Place, New York, testified that he did not consider the Bethlehem Steel Corporation "a low price mill." He added that it had been his observation that the Bethlehem company was never a leader in any downward movement of prices.

He stated that on one occasion he had changed from Bethlehem to another source of supply for bolts, nuts and rivets because of Bethlehem's "rigid price policy."

There was considerable competition and variations in prices of steel products in 1921 and 1922, Mr. Wales said, but in 1923 prices were more nearly uniform.

As to conditions which prevailed before the absorption of the Midvale, Cambria and Lackawanna plants by the Bethlehem Steel Corporation, Mr. Wales said that the Lackawanna Steel Co. was "usually in a receptive mood," meaning that its price policy was not always rigid, and with regard to Midvale and Cambria, he said that these mills were often leaders in downward movements of prices.

George H. Heilman, purchasing agent, Otis Elevator

Co., New York, testified at length regarding competitive conditions in the steel industry before and after the Bethlehem-Midvale-Lackawanna mergers. As to present steel prices, he stated that within a week he had received quotations of 2.35c. and 2.40c., Pittsburgh, on bars and shapes.

Other witnesses of the past week were George A. Prendergast, formerly New York district sales manager for the Lackawanna Steel Co.; George G. Bell, general manager, Eastern Bolt & Nut Co., Providence, R. I.; Howard R. Sherman, president, New York Switch & Crossing Co., Hoboken, N. J.

The hearing will continue, according to present indications, until some time in March.

### Belt Power Transmission Formulas

BY W. F. SCHAPHORST

For Balata belts the writer has developed a formula which is based on a well-known table as published by a prominent belt manufacturer. This is the formula:

$$W = \frac{H}{0.000158 N D (P - 1)}$$

Where  $W$  = Width of belt in inches;  
 $H$  = horsepower to be transmitted;  
 $N$  = number of revolutions per minute;  
 $D$  = diameter of pulley in inches;  
 $P$  = number of plies.

This formula is usable for Balata belts of 3, 4, 5, 6, 7, 8, 9 or 10-ply.

**Fabric Belts.**—The rules as ordinarily given for fabric belts made up in plies are something like this: "A 4-ply stitched canvas belt is equivalent to a single leather belt"—and so forth. Then, after knowing the equivalent, we have to hunt up our rules for leather belts before being able to decide on a width necessary for a given drive.

After going over these rules and equivalents, the writer has hit upon a formula that gives a direct answer. It applies to most ordinary belts made up in plies, such as rubber and stitched canvas. The formula is:

$$\frac{WS}{\frac{2640}{P} + 136} = H$$

Where  $W$  = width of belt in inches;  
 $S$  = speed of belt in ft. per min.;  
 $P$  = number of plies;  
 $H$  = horsepower.

For example: What horsepower may be transmitted by a 10-ply canvas belt whose width is 6 in. and whose speed is 4000 ft. per min.?

Substituting in the formula, we get:

$$\frac{6 \times 4000}{\frac{2640}{10} + 136} = 60 \text{ hp.}$$

Thrown into its other forms for the determination of  $W$ ,  $S$  or  $P$ , we have:

$$W = \frac{H}{S} \left( \frac{2640}{P} + 136 \right);$$

$$S = \frac{H}{W} \left( \frac{2640}{P} + 136 \right);$$

$$P = \frac{2640}{\frac{WS}{H} - 136}$$

### U. S. Steel and Carnegie Pension Fund

Total disbursements made by the United States Steel and Carnegie Pension Fund, applicable to employees of the United States Steel Corporation, for 1923 amounted to \$1,448,113. Pension cases continued beyond Dec. 31, last, numbered 4054, of which 576 were added during 1923. The average age of beneficiaries over the period since the establishment of the fund in 1911 is 66.4 years; average service, 31.6 years; average monthly pension, \$26.90. During the 13 years of its existence, the pension fund has disbursed a total of \$9,543,235, as shown in the report recently made by J. B. Erskine, manager.

# Cause of Red Stains on Sheet Brass—I

## Examination of Suggested Sources Shows That Iron Can Be Troublesome—Influence of Furnace Conditions Sometimes Harmful

BY E. A. BOLTON\*

RED stains on sheet brass have perplexed brass sheet manufacturers since the commencement of the industry. Instead of presenting, in the finished state, a clear yellow surface, brass sheets frequently show reddish streaks, spots and bands. Usually irregular in outline and more or less bright in hue, these appear immediately upon the removal of the oxide scale during the pickling process. It is generally recognized that the markings are harmless from a mechanical point of view, but they spoil the appearance of the sheet and make the customer dubious about its quality.

Many theories have been advanced as to the cause of red staining. It has been variously assumed that the stains are due to:

- Bad mixing of the metal in making the original strip, resulting in the entanglement and subsequent rolling out of copper globules.
- Chemical action, during the annealing, of salt incrustations left by the use of impure washing water after the pickling operation.
- Presence of iron, setting up a couple action in the pickling tank.
- Action of lubricating oils and greases from the rolls, collecting in patches and causing increased volatilization of zinc at those points during the subsequent annealing.
- Different furnace conditions. Some have assumed that strongly oxidizing conditions cause the staining, others that reducing and smoky conditions are the cause, and still others that the stains are caused by the use of a coal of high sulphur content. Bengough and Hudson, in the fourth report of the Corrosion Research Committee, state that the spots may arise from reactions between the pickling acid and the cuprous oxide formed during the annealing.

### Materials Used for Tests

Tests were made to determine some of these points. From samples of different kinds of sheet brass five alloys in the table were chiefly used.

	A Per Cent	B Per Cent	C Per Cent	D Per Cent	E Per Cent
Copper .....	62.36	63.50	65.02	70.72	72.56
Zinc (by difference) ..	37.28	36.02	34.67	29.21	27.04
Tin .....	0.27	0.35	0.20	....	0.27
Lead .....	0.09	0.13	0.11	0.07	0.13
Iron .....	100.00	100.00	100.00	100.00	100.00

Several other alloys were used for special tests, including nickel silver and cupro-nickel, but most of the work has been done on brass C.

### Bad Mixing of the Alloy

No experiments were carried out, but the theory seems to have no logical basis. Imperfect mixing in the works is so rare that it could not account for the considerable amount of staining observed in practice. In all cases examined the stains have been superficial, and have been easily removable by abrasion or by certain etching reagents.

### Influence of Salt Incrustations

**Theory.**—The stains are due to incrustations of salts left by the imperfect washing off of the pickling

solution or by the use of an impure washing water after pickling. The crusts, so formed, decompose during the subsequent annealing, giving free acid, which attacks the zinc preferentially, leaving a coppery layer.

**Experiments.**—It appeared probable that the stains might develop early in the annealing, and might then tend to disappear with extended time, owing to the diffusion of zinc from the inner layers into the surface coppery layer. A few experiments completely confirmed this hypothesis. But the disappearance of the stains with extension of the annealing period will generally not be complete, owing to partial oxidation of the coppery layer before the zinc has time to diffuse into it.

**Conclusions.**—Although salty incrustations from impure wash water can cause staining, the severe staining noticed in the works is certainly not due to this cause, for the following reasons:

- The stains occur to the same extent, even where no pickling and washing of the sheet has taken place prior to annealing.
- Even if the pickling and washing have been followed by annealing, the amounts of salts left on the sheet by the good quality water used nowadays must be much less than that present in some of our experiments, in which practically no staining was obtained.

### Influence of Iron

**Theory.**—The red stains are caused by the presence of iron on the surface of the sheet, setting up a couple action during the pickling. The iron is present in the brass itself in the free state, or is carried over from the coal used in firing the furnace.

Experiments showed that iron oxides present during annealing or pickling were practically harmless, but metallic iron caused staining of the brass upon pickling, particularly when the pickling solution contained some copper sulphate.

**Works Observations.**—Iron in the brass will cause staining if the iron is present in the free state. Since, however, most of the brass produced contains only small percentages of iron, it is certain that this is not the cause of the staining noted in the works. Consideration of the other view, that iron is deposited on the sheet from the ash of the coal used for firing the furnace, soon shows it to be untenable. Any small quantities carried over during the annealing would be present on the sheets as oxide, and then diluted with about 90 per cent of the other constituents of the ash.

Where rolls of brass have been tied up with iron wire during the annealing, copper oxide scale has formed under the wire and has caused staining of the brass in the pickle tank, the wire having been removed before the pickling. The use of iron wire for this purpose should be avoided, and it is noteworthy that some firms use brass wire instead.

**Conclusions.**—Iron, and to a less extent iron oxide, can cause red staining of sheet brass under certain conditions. The stains noted in the works are certainly not due to iron, for reasons discussed above.

### Volatilization and Diffusion of Zinc

A theory widely held is that sufficient zinc is lost from brass, on annealing, to cause the surface to become highly copper-rich and so appear red stained. It has been assumed that variations of furnace conditions can materially affect the rate of volatilization of the

\*University of Birmingham, England. This is abstract of a paper presented at a meeting of the Institute of Metals.

zinc. The temperature of the brass is one of the most important variables, and it is evident that increasing temperature will favor the loss of zinc.

Experiments showed that simple volatilization of the zinc (without oxidation) cannot cause staining by leaving a red copper layer, owing to the compensating effect of zinc diffusion.

#### Effect of Lubricants

Oils and greases are used extensively for decreasing the friction between the metal and the rolls. During a subsequent annealing, the oil chars and collects in patches, causing increased volatilization of the zinc at those areas, and so causing stains. A second theory differentiates between good oils and bad oils, and traces the staining to the influence of dissolved inorganic salts, alkalies and free acid. A third theory is that large amounts of sulphur in the lubricant cause staining.

Experiments indicated that pure oils, such as seal oil, vegetable oil, and the oils generally used in the works, are practically harmless, only slight stains being caused in three cases out of sixteen tests. These oils were found to be neutral in character, and to leave an inappreciable residue on burning in air. The less pure oils, such as soluble oil and shale oil, and also, as one would expect, the three acids, palmitic, stearic, and oleic, do cause staining to some extent, particularly with high-copper brass. The effect seemed to be increased slightly by allowing the specimens to heat gradually.

Of these impure oils, the soluble oil was strongly alkaline and left a residue on ignition of about 1½ per cent of sodium carbonate. The shale oil, containing 5.9 per cent of sulphur, was also slightly alkaline. The theory that the reducing conditions caused by the charring of the oil cause staining by very rapid local volatilization of the zinc is quite disproved by the fact that none of the oils caused staining in carbon monoxide.

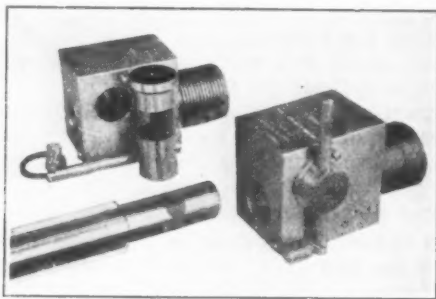
Inquiry at the works visited showed that the ordinary animal and vegetable oils are used in the rolling mill, and no cases have been observed in which impure oils likely to contain inorganic matter are used. Cases have been noticed, however, in which soapsuds have been used for lubricating purposes, with the production of considerable staining after annealing.

**Conclusions.**—Impure oils can cause staining of sheet brass. As pure oils are almost entirely used in the works, the staining is rarely due to this cause. Where oils do cause staining, the action is due to the presence of dissolved alkalies, salts or acids, and not to the local reducing conditions caused by the charring of the oil. Soapsuds should not be used where freedom from red stains is desired. The presence of sulphur in the oils is not very harmful as, with an oil containing 6 per cent of sulphur (an extreme case) no marked staining effects were observed.

(To be concluded)

#### Improved Broach Holder

The holder illustrated, for attaching broaches to the drawhead, is a recent improvement in connection with machines of the Lapointe Machine Tool Co., Hudson, Mass. Features claimed for the new device include the elimination of loose parts, which may become lost, and simplicity of engaging and releasing the broach, little or no manipulation being necessary. It is also claimed that the broach shank is stronger than with a through



Simplicity of Engaging and Releasing Broach Is a Feature of New Broach Holder

keyslot, and the crosswise slot incorporated is less expensive to produce.

The lower illustration shows the device with a broach lying before it ready to be inserted, the shank being pushed into the holder when the drawhead of the machine reaches its extreme outward position. When the end of the shank touches the cam-shaped roller, the latter is caused to make a partial rotation backward against the tension of the coil spring, thus allowing the broach shank to enter the shoulder. When the shoulder is reached, the crosswise groove in the shank is directly under the cam-roller, permitting the roller to snap back to its original place under the tension of the spring.

The particular shape of the cam prevents the rotation of the roller in the opposite direction. To release the hold, the broach is given a quarter turn in either direction, at which the roller will turn back against the spring to the position it occupies when the broach is entering. The broach may then be withdrawn.

The cross-handle in the cam-roller is necessary only for attaching the coil spring, the broach being released at any time by pulling the upper end of the handle for-

ward. This action is utilized to release the broach automatically, an adjustable stud being provided on the frame of the machine to contact with the handle as the drawhead approaches the end of its stroke.

#### Furnace and Mill Operations in the Mahoning Valley

YOUNGSTOWN, Feb. 4.—No. 1 stack Youngstown Sheet & Tube Co. at Hubbard, Ohio, goes into blast this week and No. 3 furnace Shenango Furnace Co. also is scheduled to resume iron making this week. This means that by the end of the week, Youngstown Sheet & Tube Co. will have eight of its nine furnaces in production and there will be 100 per cent operation by the Shenango Furnace Co. which, having sold its No. 4 stack for scrap, now has only two furnaces. Of the 46 furnaces in the Mahoning and Shenango valleys 33 will be in production by the end of the week, the total including 26 steel works and seven merchant stacks.

Otherwise Valley iron and steel operations are little changed from the past week. Carnegie Steel Co., Trumbull Steel Co., Sharon Steel Hoop Co., Mahoning Valley Steel Co., Falcon Steel Co., and A. M. Byers will continue at capacity.

The Youngstown Sheet & Tube Co. will have another tube furnace in its 12-in. merchant bar mill on the inactive list this week, but will have on one more open-hearth furnace. The Republic Iron & Steel Co. schedule will be practically unchanged.

Of the 120 sheet and jobbing mills next week, 92 will be under power, as in the past week, and 14 of 17 tube furnaces. Sixty of 66 open-hearths and all Bessemer will make steel. Steel ingot output will average about 90 per cent.

Steel production in the Shenango Valley is practically at capacity. The Farrell, Pa., plant of Carnegie Steel Co. set a new production record in January.

The recovery of gasoline from uncondensed still vapors has been investigated by the Bureau of Mines and a report by D. B. Dow is now available in pamphlet form as technical paper 310 of the Department of the Interior and may be obtained at 15 cents a copy on application to the superintendent of documents, Government Printing Office, Washington.

## SAGUNTO STEEL PLANT

### Shipment of American Material—Equipment Includes 48-In. Blooming Mill

America's Industrial Armada to Spain is the way a 34-car train of steel mill plant electrical equipment for the Cia Siderurgica del Mediterraneo (Metallurgical Co. of the Mediterranean) at Sagunto, Spain, is styled, which left the East Pittsburgh works of the Westinghouse Electric & Mfg. Co. on Jan. 28. The total value of the shipment is more than \$500,000 and is part of a development, costing several millions, of which that represented by purchases in America approximates \$2,000,000.

The shipment included a 5000-hp. motor, which will be installed in a blooming mill with rolls no less than 48 in. in diameter; a 3750-hp. motor for a 28-in. structural mill; a three unit motor generator set, consisting of one 3500-kw. and one 3000-kw. generator with a 180,000-lb. flywheel, all driven by a 5000-hp. induction motor; a four unit exciter set, blower and air washer equipment for forced ventilation, switchboard and automatic control equipment.

This comprised one unit of the shipment. There was also a 3000-hp. motor for driving a 36-in. three-

high plate mill, and its gear unit, in addition to the driving motors; 85 auxiliary mill motors with automatic control equipment for use in the various mills; three rotary converters with accompanying switchboard and three transformers each with a rating of 1100 kva.

The Sagunto plant, which will be among the most modern in the world, was designed and constructed from the drawings and specifications and under the supervision of Frank C. Roberts & Co., consulting engineers of Philadelphia. The plans call for complete works, including coal dock, by-product coke ovens, blast furnaces, open hearth steel furnaces and rolling mills all for an ultimate capacity of 1200 tons per day of finished product.

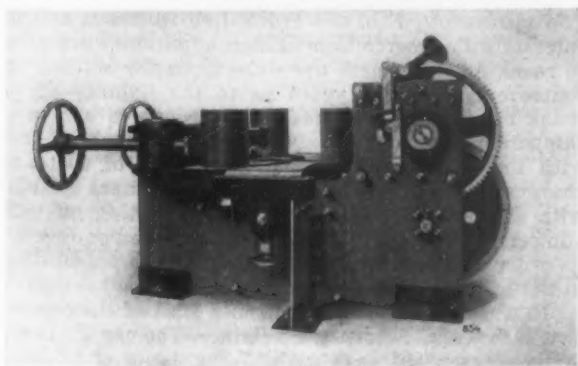
Sagunto is the ancient town of Saguntum, captured by Hannibal 219 B. C., and is ideally situated for the new plant, according to Mr. Roberts. Iron ore lies in deposits that were worked by the Carthaginians and are located in Sierra Manera mountains, about 130 miles from Sagunto. The ore is transported to Sagunto over the company's own railroad. From this point Spain exports vast quantities of ore. The company operates its own fleet of 50 ocean steamers.

Practically all the machinery and equipment of the mill is of American design and manufacture and the actual operation will be in conjunction with experienced American steel men.

### Bending and Straightening Machine

A horizontal bending and straightening machine, on which bars, flat beams, channels, and other material of small and large section may be bent or straightened, has been added to the line of Henry Pels & Co., New York.

The general arrangement of the machine may be noted from the illustration. The bending blocks are moved forward and backward on an arc. As the blocks approach the ram head, their center distance is shortened to fit smaller sections and shorter



The Bending Blocks Are Moved Forward and Backward On an Arc. As they approach the head, their center distance is shortened to fit smaller sections

radius curves, and as the blocks recede from the ram the center distance is lengthened, accommodating larger sections and longer radius curves.

Special adjustment of the bending blocks from each other according to the size of the section to be bent is said to be unnecessary, the arc of travel of the blocks taking care of this feature. The arc lines of travel of the bending blocks has been determined from the moment of resistance of various sections as figured theoretically, combined with tests on various materials. In judging whether a beam can be bent on a machine, the shape of the section and its moment of resistance should be considered as well as the weight. For bending rails and similar heavy sections blocks are used between the ram head and the section to be bent.

When a beam to be bent is placed in the machine, the blocks are adjusted toward the ram head until the latter, in its travel, starts the bending. The blocks are then further adjusted until the curve desired is obtained, then the length of section to be bent can be fed through the machine as far as necessary.

### Plans of Newly Organized Belfont Company

The Belfont Steel & Wire Co. will be the name of the new company formed at Ironton, Ohio, from the merger of the Belfont Iron Works and the Kelly Nail & Iron Co. The company will absorb both the Belfont and Kelly properties, concentrating its manufacturing activities in the wire and nail plant of the Belfont company, to which the machinery of the Kelly plants is now being moved. The capital will be \$5,000,000. This will double the wire and nail capacity of the present Belfont company. Plans for the erection of a steel plant on the Kelly property are now under way, and this work is expected to be started this spring. The new company will also operate the blast furnaces of the Belfont and Kelly companies. Announcement of the new company was made in THE IRON AGE Jan. 17, page 218.

S. G. Gilfillian, formerly chairman of the Board of the Belfont Iron Works Co., will hold a similar position in the new organization, with S. Coles Peebles, formerly president of the Belfont Iron Works Co., president and I. P. Blanton, former president of the Kelly Nail & Iron Co., vice-president and general manager of sales for the wire and nail department. The company's pig iron products will be sold under the direction of Ed C. Smith, present sales manager of the Belfont company.

### New York Central Uses Trucks for Less Than Carload Lots

Annulling its way freight train, the Putnam Railroad, a branch of the New York Central & Hudson River Railroad, has just substituted an automobile truck service in Westchester County to handle less-than-carload shipments between various stations from Yonkers to Brewster. Hitherto the Pennsylvania Railroad has been the only one actually to place trucks in operation.

Automobile trucks now take freight from the Hudson Division of the New York Central at Yonkers to Dunwoodie station on the Putnam and all stations north as far as Yorktown Heights. Another truck collects and delivers freight between Yorktown Heights and Brewster, stopping at all intermediate stations. Formerly a local freight train picked up and delivered all these smaller shipments. Only two five-ton trucks are being used in the present experiment. If the service proves as satisfactory as expected, additional trucks will replace local freight trains on other divisions of the New York Central, says Superintendent Vantassel.

## SAFETY ORGANIZATIONS MERGE

### Important Step Taken at New York Meeting— Rules Governing Use of Light

Consolidation of the American Society of Safety Engineers and the Engineering Section of the National Safety Council to be known as "The American Society of Safety Engineers, the Engineering Section of the National Safety Council," was announced at a banquet following a joint conference of the two organizations in New York, Jan. 22. The activities of the new organization will include monthly meetings in New York and meetings in other cities, including Chicago, Cleveland and San Francisco, in addition to the sectional meetings at the annual Safety Congress, participation in standardization and safety code work and research committees on special problems.

The morning session of the joint conference in New York was devoted to the general topic of handling material, with Ralph E. Prouty, supervising safety engineer, Aetna Life Insurance Co., acting as chairman. Various phases of the problem, with remedies for accident causes, were presented by David S. Beyer, vice-president, Liberty Mutual Insurance Co., Boston, F. D. Campbell, the Lamson Co., New York, and A. L. Lewis, president, Lewis Shepherd Co., Boston. The program for the afternoon session comprised papers on several subjects. Safety in electric welding and cutting was dealt with by D. H. Deyoe, General Electric Co., Schenectady, N. Y., and safety in gas welding and cutting by H. S. Smith, Union Carbide & Carbon Corporation.

Of particular interest was the address by Dr. Charles Sheard, Research Laboratories, American Optical Co., Southbridge, Mass., on "Glare—What It Is and What It Does." Dr. Sheard gave the following rules governing the use of light:

1. The light should shine on the object under examination, but not in the eyes of the observer.
2. The first remedy is the use of diffusing glass globes, reflectors or shades.
3. The contrast of brightness should be within the ratio of one to 100. This means the adoption of indirect or semi-indirect lighting in which the brightness of the bowls is reduced.
4. Localized lighting should be used only in conjunction with some general system of lighting, so as to avoid marked contrasts.
5. Avoid the glare of reflection from polished surfaces.
6. The eye works with approximately normal efficiency upon surfaces possessing an effective luminosity of one lumen per sq. ft.
7. Both excessive illumination and inadequate illumination strain and fatigue the eye in order to obtain sharp definition.
8. Intrinsic brilliancy of more than five candle-power per sq. in. should be reduced by a diffusing medium if the rays enter the eye at an angle below 60 degrees with the horizontal plane.
9. Flickering, unsteady or streaked illumination strains the eye and produces irritation in the eye in its attempt to maintain vision.
10. Special protective glasses should be used to protect the eye from ultra-violet radiation in excess of that present in daylight as well as infra-red radiation from high temperature molten surfaces.
11. Windows should form as large a percentage of the total wall area as is possible.
12. Window shades used indiscriminately are conducive to contrast glare effects. Translucent screens and shades are generally preferable.
13. Ground glass and the like should be avoided in window sashes which are below the level of the eye, as they cause an increase of brightness in the retinal images thrown on a portion of the retina unaccustomed to such brightness.
14. Dark colored finishes, walls and ceilings should be avoided if eye comfort is desired, since they are likely to introduce glaring contrasts.

### Mid-Year Safety Conference at Chicago

The mid-year safety conference of the National Safety Council's engineering section, the Chicago Safety Council and the Western Society of Engineers will be held at the Morrison Hotel, Chicago, Feb. 19, and will include morning and afternoon sessions and a dinner meeting. The woodworking section of the council will participate in the morning program which will be devoted to woodworking hazards, featured by an exhibit of home-made and commercial guards. In the afternoon, several phases of industrial health and medical work will be discussed with Dr. F. G. Barr, National Cash Register Co., Dayton, Ohio, and Dr. S. M. Francis, Buffalo, as the principal speakers. The program of the woodworking session follows:

Chairman, George E. Sanford, General Electric Co., West Lynn, Mass.; chairman, Woodworking Section, National Safety Council.

1. Safe Layout of a Woodworking Plant or Department—A. S. Kurkjian, Oliver Machinery Co., Grand Rapids, Mich.
  2. Use and Care of Saws—S. H. Disston, vice-president, Henry Disston & Sons Co., Philadelphia.
  3. Fire Protection for Woodworking Plants and Lumber Yards—John Plant, chief engineer, Bureau of Fire Prevention & Public Safety, Chicago.
- Discussion led by John A. Neale, chief engineer, Chicago Board of Fire Underwriters.
4. Round table discussion on woodworking machinery safeguards. Companies which have developed home-made guards, as well as those selling guards, have been invited to bring or send specimens for exhibit or to send photographs or slides.

### More Pay for Iron Workers

Another agreement in the building trades will give 5000 iron workers in the New York metropolitan area an increase in wages of 50c. per day. This area includes Jersey City and Newark, and the agreement expires Feb. 1, 1926. The men had been receiving \$10 a day and asked for \$11.

### Liability of Carriers to Iron and Steel Producers

WASHINGTON, Feb. 4.—Trunk line railroads and the Interstate Commerce Commission apparently are about to reach an agreement upon the basis for settling the controversy of eight years as to the liability of the trunk carriers to iron and steel producers and other shippers owning industrial railroads. The subject deals with the question of the non-absorption of switching charges. On April 1, 1914, the trunk carriers complied with the decision of the commission cutting off these allowances. On April 14, 1915, the commission reversed its order as a result of a decision of the Supreme Court in the so-called Tap Line case.

In a memorandum to Chairman Hall of the commission last week, Attorney Examiner Thomas P. Healy, in passing on the case entitled the Jones & Laughlin Co. vs. the Pittsburgh & Lake Erie, et al., suggested a basis of settlement of these disputes without further hearings. His proposal is based on correspondence between Chairman Hall and General Solicitor Clyde Brown, of the New York Central Line.

For purposes of illustration and review, Mr. Healy used cases involving the claims of shippers on the Monongahela Connecting, South Buffalo, Union, Newburgh & South Shore and the Lake Terminal railroad, all owned by steel companies. Broadly, the trunk lines concede their liability to make reparation and it is believed they will do so. But by reason of the fact that they cancelled the allowances as a result of the original order of the commission which at that time held that the industrial lines were not common carriers, but mere plant facilities, the trunk lines object to any admission of illegal conduct.

### N. M. T. A. Convention

The twenty-sixth annual convention of the National Metal Trades Association will be held at Hotel Astor, New York, April 23 and 24.

# Waste-Heat Boilers at Weirton Steel Plant\*

Analyzed According to the Hydraulic Theory of Furnaces  
—Belief Expressed That Waste-Heat  
Boilers Are Undesirable

BY PROF. W. E. GROUME-GRJIMAILO

**W**ATER-TUBE boilers will work most efficiently when their tube surface is swept uniformly by the hot gases; and when counter current circulation of the water in the tubes and the hot gases surrounding them is provided. These conditions are necessary for the most efficient transfer of heat.

The waste-heat boilers at the plant of the Weirton Steel Co.† which are installed between the 100-ton open-hearth furnaces and the stacks, present an erroneous construction when considered according to the hydraulic theory of furnace design. It has seemed desirable to give my American readers an analysis of why their con-

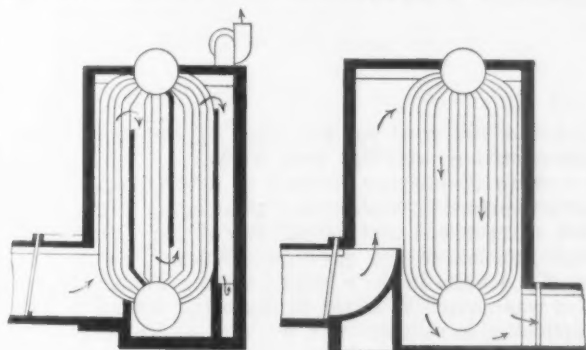


Fig. 1

Fig. 2

struction is based upon wrong principles and present them with suggestions for correct methods of construction which will insure the logical operation for efficient heat transfer.

The hydraulic theory of furnace design has successfully passed the practical test of actual operating conditions. Furnaces built according to these principles have worked successfully from the start, in an irreproachable manner. When these principles of design are correctly used there is no more uncertainty in regard to the success of the project than there is in connection with the designing of a steam turbine, or other machine, on established lines.

Considering the violations of the hydraulic principles of furnace design which are presented by the waste-heat boilers at Weirton: After passing through the reversing valves the waste gases enter the first pass of the boilers at a temperature of about 1300 deg. Fahr. (700 deg. Cent.). In rising to the top of the setting their temperature drops about 250 to 375 deg. Fahr. According to the hydraulic theory of furnace design, hot gases in giving up heat will not subdivide uniformly between channels through which they pass in an upward direction. The hot gases passing upward through the tubes of a boiler tend to form local hot currents, so that the tubes are not in contact with

gases at a uniform temperature. From this it will be apparent that the gases in the first pass of the Weirton boilers are circulated in an irrational manner.

In the second pass of the boiler the hot gases, cooling, pass downward. This will give uniform heating conditions in this pass.

In the third pass the gases rise and the conditions are the same as those found in the first pass.

From the top of the third pass the gases flow into the economizer. Here the fourth pass will give uniform heating and the fifth pass will give irregular heating.

Of the five passes in the boiler and economizer, two have a rational direction of flow and three have an irrational direction of flow. Between these passes there are four changes in the direction of flow, of 180 deg. each. These conditions considerably increase the draft loss through the boiler.

The hydraulic theory of furnace design indicates that a single-pass boiler will function correctly with uniform heating conditions. Fig. 2 illustrates the boiler setting designed in this manner. Fig. 1 shows the setting in use at Weirton.

In Fig. 2 the hot gases entering the setting are directed to the top in a clear space where they do not come in contact with the cold tubes of the boiler. After having reached the top of the chamber, the hot gases tend to form a zone of uniform heating conditions automatically maintained by the influx of hot gases as fast as the gases are cooled, and flow downward around the tubes. Each tube forms the center of a downward stream of uniformly cooling gas flowing to the boiler outlet port, through which the coldest gases pass away from the setting. The correct circulation from top to bottom will be uniformly maintained without baffles and without any disturbance of the uniform flow of heat from the gases to the tubes.

By introducing a correction coefficient, the velocity of the downward flow may be computed by the use of the formula for jets of gas directed vertically downward. This formula, in English and metric units, may be found on page 292 of "The Flow of Gases in Furnaces." M. Slessareff, who made a special study of this subject at the Polytechnic Institute of Petrograd, has determined that this coefficient is equal to 0.7 and the formula may be stated as follows:

$$v = \sqrt{0.7 \frac{t_m - t_i}{273 + t_i} 2gh}$$

in which:

$v$  = velocity of descent of the cold stream;

$t_m$  = temperature of the hot gases;

$t_i$  = temperature of the coolest gases;

$g$  = the gravitational constant;

$h$  = vertical height from top to bottom drum of the boiler

Regardless of the number of tubes in the boiler, the streams of gas, at each level, will have the same temperature and weight. It is not difficult to demonstrate this. Assume that one of the streams becomes cooler than the others: Its weight will increase and it will commence to drop toward the bottom of the setting more rapidly. The influx of hot gases to the top of this tube will become more rapid and this will tend to increase the temperature of that stream, which in turn will decrease the velocity of downward flow.

The rational construction of a boiler setting is a single chamber which the gas enters and leaves at the lowest points. This places the boiler within a pocket.

\*Translated into French by Léon Dlogatch; translated into English by A. D. Williams.

In sending the manuscript, Mr. Williams writes: "It is practically impossible, with hot producer gas as well as other fuels, to reduce the waste gas temperature to that stated by Prof. Groume-Grjimallo, unless a lot of air leaks into the chambers and flues. The reason for this is that the ingoing gases and air do not have sufficient heat capacity to absorb all this heat. This will be particularly the case if the chambers are insulated. A higher degree of preheat will reduce the surplus available for steam generation, but there are limits on the temperature to which preheating may be carried. "Foreign practice with small furnaces agrees with Prof. Groume-Grjimallo's idea, mainly because there is not enough [quantity] heat leaving the regenerator [of the small unit] to generate a worth-while amount of steam."

†Revue de Metallurgie, 1922, page 108; THE IRON AGE, March 10, 1921, page 624.

The hot gases rise to the top of this pocket, for example, as on the left of Fig. 2, descending along the tubes, to which they give up their heat. There is only one change in the direction of flow, which occurs without any loss of head, as it is due to the difference in weight of the gases. It also follows that the resistance to the circulation of the gases will be, practically, zero. Therefore the draft required by this boiler will be very small, and it will not be necessary to provide it with a forced draft fan. The chimney requirements of the furnace itself will be sufficient and will be the same, with or without the boiler.

The boiler setting shown in Fig. 2 has the advantage of giving a counter current circulation of the water and the gases. This being the case, the transmission of heat will be proportional to the difference between the velocity of the water and that of the gases. This difference will be considerable, in spite of the low velocity of the gases.

An economizer has not been shown in the suggested change in the boiler setting. The writer is of the opinion that the temperature of the waste gases at the bottom of the setting will be low enough to make the economizer unnecessary. But if the pressure of the steam is 16 atmospheres (about 225 lb. per sq. in.), the temperature of the water in the tubes being 200 deg. Cent. (392 deg. Fahr.), the economizer may be

set in the same manner as the boiler. A superheater would be set in the same manner, also.

There are a number of details which should be carefully considered in connection with the design of the boiler, but they do not enter into this consideration of the problem.

The writer does not consider that the setting of the waste-heat boiler close to the open-hearth furnace shows a high degree of desirability. American designers locate it in this manner, without increasing the volume of the regenerators. The volume of the regenerators at each end of the 100-ton Weirton furnaces is about 133 cu. ft. per ton. For this reason the gases leaving the chambers will be at a high temperature, which makes it desirable to provide boilers to utilize the waste heat. According to the writer's computations, the volume of the regenerators should be 6 cu. m. (210 cu. ft.) per ton, which would result in decreasing the waste gas temperature to about 400 deg. Cent. (752 deg. Fahr.). This would decrease the amount of fuel required and give an installation which would be less complicated and cost less to operate.

Without accepting the necessity of the waste-heat boiler on an open-hearth furnace, the writer is not suggesting changes in the furnace itself, but has merely considered the boiler setting as affording an application of the hydraulic theory of furnace design.

## INCLUSIONS IN STEEL\*

### Identification of Non-Metallic—New Etching Methods

In the tentative methods of metallographic testing of iron and steel (E 3—21 T), presented by committee E-4 on metallography in 1921, the chief methods for identification of non-metallic inclusions were given. An attempt was then made to give in tabular form the various means of distinguishing these different inclusions.

In actual work, while it is often comparatively easy to identify the larger and more characteristic inclusions such as typical manganese sulfide, iron silicate, oxide, sand grains, there are always some inclusions whose identity is in doubt. The reason for this is at once evident if we consider the constitution of the various sulfides, oxides, silicates, etc. For example, when we examine a sample of puddle slag or tap cinder, which has been allowed to solidify and cool comparatively slowly, the structure is quite coarse and the different constituents have crystallized out in regular order and can be identified, but when we examine slag inclusions in wrought iron we find, in one and the same section, quite a variety of inclusions varying in structure and apparently in composition from what we consider to be pure oxide to pure silicate. That the silicate is variable in composition there can be little doubt. In steel the variation is probably even greater. Slag inclusions in steel are probably solid solutions of manganese and iron silicates in acid steel, but in basic steel are generally duplex in structure and show grains and sometimes crystals of oxide, etc., surrounded by a matrix of silicate. In the same way manganese sulfide can contain over 50 per cent of iron sulfide in solid solution and its color changes correspondingly. Probably what we generally term "iron oxide" contains more or less manganese oxide in solution.

As these various sulfides, oxides and silicates vary in composition, so will their etching characteristics vary to a greater or less extent, and this must be taken into account in any systematic method of determination.

Since 1921, considerable work has been done on this subject and a number of new methods of etching have been tried or suggested. During the past year, Mr.

Comstock has tried out a number of reagents and the accompanying table has been worked out by him with a view to simplifying methods of determination. This table is presented with a view to bringing forth discussion, suggestions and corrections rather than as the final solution to the question. Where two methods equally definite in their results were available the simpler was chosen in order to make the scheme of easy application in routine work, where time is a serious factor. For research work, in contradistinction to routine determinations, the more elaborate and lengthy methods can be used.

### Determination of Inclusions in Steel

Polish carefully with minimum pitting, and project magnified image on ground glass by arc or equally white light, without color screen. Note color.

#### A. Gray or black inclusions.—

Etch with 10 per cent nitric acid in alcohol for 10 sec.

Attacked=lime compound from mold wash.

Unattacked, etch with 10 per cent chromic acid in water for 5 min.

Attacked=Manganese sulphide.

Unattacked, etch in boiling alkaline sodium picrate for 5 min.

Attacked=Manganese oxide.

Unattacked, etch in strong boiling KOH for 10 min.

Attacked=Manganese silicate.

Unattacked, etch with strong solution of stannous chloride in alcohol for 10 min.

Attacked=Iron oxide. (May be checked by electrolytic reduction with nascent hydrogen, when FeO is reduced to metal and other inclusions are either attacked or unchanged.)

Unattacked, etch with fairly strong HF solution (McCance sol. B) 10 min.

Attacked=Iron silicate.

Unattacked, repolish and note color and form:

1. Very dark color, fine particles difficult to polish without pitting, not elongated by hot work=Alumina.

2. Color not especially dark, easily polished smooth without pitting:

(a) Fairly large angular fragments, showing changeable bright spots as focus is changed=Sand grains (in steel castings).

(b) Small angular particles, bluish in color, without changeable bright spots=Probably titanium oxide (in titanium treated steel).

#### B. Brown, yellow, red or purple inclusions.—

Etch in strong boiling KOH or alkaline sodium picrate for 10 min.

Attacked=Iron sulphide.

Unattacked:

1. Purplish color, rather easily polished smooth=Chromium oxide.

2. Pink color, strongly angular form, rather difficult to polish without pitting=Titanium cyano nitride.

3. Yellow, cubes or cubic forms=Zirconium nitride.

\*To be printed in the *Proceedings* of the American Society for Testing Materials, and written by William Campbell and G. F. Comstock.

## BOOK REVIEWS

**Problems in Machine Design.** By O. A. Leutwiler, M.E. Pages 131, 6 × 9 in.; illustrations, 63; problems, 514. Published by the McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$1.50.

This is by far the best collection of problems in this line that the reviewer has seen; and it has the distinct advantage that the problems have been selected from actual practice. Some of the formulas in the old text books and engineers' pocket books gave ridiculous results. For instance, one for the thickness of hydraulic cylinders would have given for these that raised the sections of the Menai tubular bridge about 14 in., whereas the cylinders themselves were only 4 in. thick. There is, however, in this volume a great disadvantage, that it is a supplement to the same author's "Elements of Machine Design," the possession of which is absolutely necessary to the full use of the collection of problems—especially those calling for formulas. For instance, under the head of "Cylinders" the student is told to use both the Lamé and the Clavarino formulas. But "Kent" has only the former of the two. The value of the excellent illustrations would be enhanced by explanatory legends. An alphabetical index to this rich material would also be a great improvement.

**The Price of Coal.** January Number of the Annals of the American Academy of Political and Social Science, Philadelphia. Pages 362, 6½ × 9¼ in.; paper bound.

This is a series of papers by writers in widely different positions—economists, the Governor of Pennsylvania, labor union officials, coal operators, engineers, dealers, and others. Several of the papers, but no very large part of the total matter presented, are digests of portions of the United States Coal Commission's report. There are eight general divisions, each containing several papers by different writers, these being: Wages, hours and working conditions in the bituminous and anthracite fields; wages and working conditions in the bituminous industry; wages, hours, working conditions and prices in the anthracite industry; labor relations in coal mining; costs and margins in producing and distributing coal; efficiency and cost reduction in coal mining; fuel economy and giant power; some steps on the way out. Then there is appended an extensive bibliography.

It is a collection of a large amount of information and a collection of the views of many people. These views are brought together only in the barest physical sense, in that the printed pages are held together in one binding. No one attempts, and probably no one would venture to attempt, to harmonize the different opinions. There stands out prominently between the lines the conception that something is radically wrong about coal, for much that is said is criticism and much more is defense, not visibly provoked, of the miners or of the operators as the case may be.

One reads in one place, to illustrate, that nearly all the labor is the commonest kind of common labor, and in another place that the housing and community conditions are far below the general standard of industrial workers in the United States. In each case the treatment reads like an attack, whereas the reader may feel that the things are not entirely inharmonious.

Again, one sees the familiar statement in several places that the coal producing capacity is largely in excess of the requirements, F. G. Tryon of the U. S. Geological Survey placing the capacity in his paper at 900,000,000 tons in bituminous with the present labor force, against a demand of approximately 550,000,000 tons. On the other hand 30 pages are devoted to discussions relating to development of water power and the waste of fuel, these discussions looking to a reduction of the 550,000,000 tons.

Various statements are made, chiefly by the labor union officials, that the annual earnings of the mine workers are not high but rather do not afford a fair

living. This, of course, is merely the familiar "living wage" fallacy. Practically all industrial workers could lay claim to increases on this basis; but when all the increases had been made there would be no more food, clothing, shelter and comfort than there are now. It would merely take more dollars to pay for the things.

Much space is given to "some steps on the way out." These deal largely with details and economies.

The symposium furnishes a vast amount of information. We know that the public is interested in coal, but it is not clear that the public wants detailed information. We know that the public is dissatisfied; but it is doubtful whether the emotion of the public is a desire for somewhat cheaper coal; in the case of bituminous at any rate, on an average. What every one does know is that the public is angry at being called upon at times to pay several dollars a ton more for coal than at other times. That is the principal feeling the public has and it wants assurance that its anger will not be aroused again by the market price of coal rising several dollars a ton. If a way could be found to insure against such raids on the pocketbook it would not require many pages to outline it in detail. The more workable the proposed remedy the less space would be needed to explain it in full.

**Drawing Room Practice.** By Frank A. Stanley. Pages 253; 6 × 9 in.; illustrations, 487. Published by the McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price, \$2.50.

This book is especially valuable as giving, what few works having the same object give, hundreds of photographic views of machine parts, tools, etc., with their reproduction in orthographic projection with corresponding dimensions and working instructions. It has, however, some faults of omission. The isometric system of projection receives scant attention and deserves much more; as isometric drawings can be understood by many a mechanic who cannot comprehend the usual orthographic system. Further, the pattern maker and the blacksmith can measure better from them in all three axial directions.

The draftsman who reproduces all the drawings given should in the end prove versatile and competent; and such reproduction would be well worth the time of any learner.

**Design and Construction of Oil Engines.** By A. H. Goldingham. Fifth edition; in two parts. Pages 200, 5 × 7½ in.; illustrations 112, tables 30. Published by Spon & Chamberlain, New York. Price, \$4.

The contents of this book are curiously diffused; the first part going into design and construction of parts, testing installation, operation and correction, with special chapters on two-cycle and four-cycle oil engines of various types; the second commencing with the history and classification of oil engines, their design and testing, and such details as cooling-water tanks; then going into their application to driving dynamos, air compressors, water pumps, etc.; followed by instruction for running oil engines, making repairs and mastering troubles; while then comes a description of various engines, with special chapters on portable and large-size engines, with final chapters on fuels, and miscellaneous matter.

With such an arrangement it is difficult to review the book properly *seriatim*; but the first thing to note is that in this new edition the chapter on Diesel engines that appeared in the fourth, is omitted, (although the Worthington vertical Diesel type is described.) The Diesel engine is the subject of another book. In this respect, then, in this volume the author is "playing Hamlet without the Prince of Denmark"—although he really announces the whole play in the title.

As each part has its own alphabetical index, it is difficult to find out what matters are treated and what are not. Of contemporary motors many good examples of oil engines other than Diesels and "semi-Diesels," of Continental and British make—to say nothing of our own—find no place. Very properly the reader is shown that as the Carnot cycle represents the ideal efficiency of a heat engine, and the Rankine cycle that in a steam

engine, so with the internal combustion engine the air standard scale, which assumes that gases obey the laws of Charles and Boyer within practical limits, that complete combustion takes place at once at stroke end, and that the gases are always in thermal and chemical equilibrium, serves the same purpose.

The mathematical treatment does not extend beyond quadratic equations. The advantages and the disadvantages of the two-cycle and the four-cycle types are detailed before these cycles are described. The valve-setting instructions and the events in a rotation are well illustrated by diagrams. Although the author very properly deprecates the use of the term "semi-Diesel," he employs it himself with reference to the Petter type.

The book would be much more useful if the matter were redistributed, also supplemented by detailed descriptions of oil engines up to 1922.

R. G.

### Annual Report Bureau of Foreign and Domestic Commerce

In a 170-page report to the Department of Commerce, the Bureau of Foreign and Domestic Commerce gives a history of its operations for the year ended June 30 last. The activities of the bureau and its services to American business are indicated by the fact that it responded during the year to 972,702 individual requests for information and assistance on trade problems, an increase of about 65 per cent over the 589,533 items of the preceding year. Publications of the bureau, covering a wide variety of materials and issued weekly, monthly and otherwise, form a large element in its activities. The several divisions furnish occasional data for publication in trade publications devoted to their specialties, as well as copy for newspaper use. In particular, there were a large number of trade information bulletins prepared, covering commercial requirements of specific localities, surveys of the movement of specific materials, etc.

### Swedish Year Book, 1924

Edited and published in Stockholm, the Swedish Year Book is a 265-page compendium of information about Sweden and the activities of its inhabitants, issued by the Consul-General, 70 East Forty-fifth Street, New York. It deals not only with foreign commerce, industry and mining, agriculture, banking and such matters, but also with the Government, the legations and consulates abroad, state finances and defense, education, geography, history of Sweden, labor matters, cost of living, music, sports, touring and a large number of other subjects.

Population at the end of 1922 is given as 5,987,520. The number of factories in 1921 was 10,775, having a total of 367,716 officers and workers and producing products valued at 4,119,241,501 kr. The book is illustrated with a number of colored plates and maps and diagrams.

The year book of the Comité des Forges de France is a volume of no less than 1570 pages published by the Comité des Forges, 7 rue de Madrid, Paris, France, at a price of 25 francs. It gives a list of all the members of the Comité des Forges, or in other words the metal working plants all over France and information as to the nature of their production, etc. To facilitate reference it has an index arranged by region and by product. Information can also be found respecting the Union des Industries Métallurgiques et Minières, and mechanical, electrical and metallurgical industries as well as all allied industries, also the different provident societies which have been organized under the patronage of the Union des Industries Métallurgiques et Minières and the Comité des Forges de France. Lastly, it gives a technical list of the concerns which supply the metallurgical industries and the metallurgical and mechanical construction companies.

## MACHINE TOOL PROSPECTS

### Forward Look as to Demand and Prices Given by Frank A. Scott

What 1924 promises for the machine tool builder was discussed at a conclusion of a review of the year 1923 in the machine tool trade contributed by Frank A. Scott, president Warner & Swasey Co., Cleveland, to the annual financial number of the *New York Evening Post*, Dec. 31, 1923. What he had to say of the prospects was as follows:

Looking forward to 1924, there are many indications that the industry has little to fear. It is not likely that any buying boom will be experienced. There will undoubtedly be a modest amount of expansion in some lines; there will be at least the usual quota of metal working industries started; there should be, and undoubtedly will have to be, a considerable volume of replacement business, coming partly as the result of need for machines to take the place of worn out equipment and in part to meet the natural and necessary changes suggested by better production programs. Fortunately for the industry, some of its largest customers have just completed a year which has resulted in satisfactory profits, notably the railroads, automotive, building supplies, and electrical industries. Replacement in the two former, and expansion in the latter, should develop a considerable volume of orders.

The price trend in 1924 will probably be upward. Costs may in some instances be reduced in a small way, due to better methods and greater economies, and these, with slight increases in price, will provide a better profit for the industry. If the industry is to continue to serve its customers well, this profit will be required.

Those companies that are prepared to render prompt and intelligent engineering service, whose representation is in the hands of qualified and energetic men and whose product is of a sort to fit the present requirements of the metal working shops, can look into 1924 with great confidence.

### British Iron and Steel Prices

W. Richards & Sons, Ltd., Middlesbrough, England, have sent out a chart showing changes in the prices of a number of iron and steel items for the period from 1914 to date. These include rivets, iron castings, steel angles and joists, crown quality bar iron, steel plates, rails, No. 3 foundry pig iron, and also the bank rate in percentage. The diagram shows in a striking way the great peak of 1920 and the continuous tumble of prices from the end of that year until the fall of 1922.

### Cast-Iron Pipe, December, 1923

WASHINGTON, Feb. 4.—The Department of Commerce announces statistics on production, shipments, orders and stock of cast-iron pipe for December, 1923. This report includes returns from 12 establishments and is confined to bell and spigot pressure pipe exclusively. The tonnage for principal items follows:

Pipe produced during the month (tons).....	63,714
Pipe shipped during the month (tons).....	59,434
Orders for pipe specified to be shipped from stock (tons) .....	16,917
Orders for pipe specified to be made (tons).....	168,383
Orders for pipe not specified as to size (tons) .....	2,777

### New Books Received

**Wealth and Income of the American People.** By Walter Renton Ingalls. Second edition. Pages 372, 5¼ x 8½ in. Published by G. H. Merlin Co., York, Pa. Price, \$3.50.

**Current Economic Affairs.** By Walter Renton Ingalls. Pages 211, 5¼ x 8½ in. Published by G. H. Merlin Co., York, Pa. Price, \$2.50.

**Commercial Statistics for the Calendar Year 1922.** Extract of Annual Report of the Chief of Engineers, U. S. Army, 1923. Compiled by the Statistical Division, the Board of Engineers for Rivers and Harbors. Pages 1425, 6 x 9¼ in. Published by Government Printing Office, Washington.

# Boundary Lubrication

## Being the Separation of Metallic Surfaces by an Oily Film of Microscopic Thickness—Conception of Safety Valve Action

BY ROBERT W. A. BREWER\*

THE most recent conception of lubrication includes a state of partial oiling which occurs before the film of oil is completely broken down. Frictional losses in lubricated bearings are generally higher than need be, because of the factor of safety allowed to meet abnormal conditions. Usually this factor is 5 or even 10 because, in the types of bearings employed in common practice, the film carrying power rapidly breaks down when a critical condition is reached.

What is termed "boundary lubrication" provides a safety valve to meet such abnormal conditions and further furnishes a foundation upon which a failing film can rapidly be rebuilt. The fact is generally accepted that a boundary film persists and is not affected by what may occur on top of it. This film may be of a colloidal nature and the following simple explanations are in support of its method of formation.

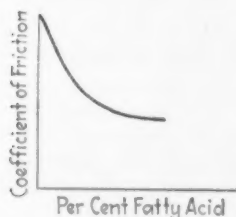


Fig. 1

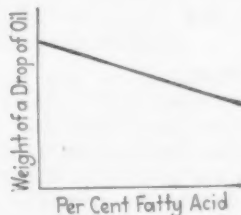


Fig. 2

The value of the boundary film lies in the safety it affords for employing a reduced film thickness for complete lubrication, with consequent reduction of the shearing forces in the oil film and loss sustained in operation. Tests of Wells and Southcombe, confirmed by others, show that there is a relation between surface tension and frictional loss. Although the weight of a drop of oil is proportionally reduced as the fatty acid content is increased, up to a certain point, the reduc-



Fig. 3.—On a Surface of Metal With Boundary Lubrication, Any Excess of Oil Will Flow Into Mounds, With Fatty Acid In

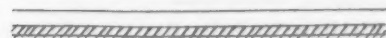


Fig. 4.—Same Surface With Neutral Oil

tion of friction is much more rapid, with the first small addition of fatty acid than when larger amounts are added.

There is probably what W. B. Hardy terms a "latent period" during which time orientation of the molecules occurs. He states that this has a critical value when the proportion of mineral oil is 99 per cent.

### Safety Valve Action

The property of oiliness may properly be considered as the setting of the safety valve in a lubricating system. We know that in steam engine practice the higher the boiler pressure which can be carried, the greater

will be the possible power output from any one engine. This analogy can be interpreted to the relation between the oiliness property of an oil and the frictional loss in the place where the oil is used. For example, we know that a certain thickness of oil film is maintained in a completely lubricated bearing, which thickness depends on the viscosity of the oil and the pressure carried by the oil film.



Fig. 5.—Molecules of Neutral Oil on a Surface, With No Particular Arrangement and Easily Broken Up

The thinner the oil film the less is the frictional loss due to shearing, so that for minimum loss the oil should be as fluid as can be used safely and the clearances small. As the viscosity of the oil decreases rapidly with rise of temperature in the region of ordinary working conditions, a margin of safety must be allowed in the permissible thickness of film for complete lubrication. In practice this means the use of an oil of considerably higher viscosity than that which would show minimum frictional loss.

If a bearing which is lubricated with a straight

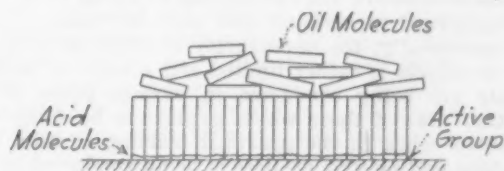


Fig. 6.—Molecules of Oil Containing Fatty Acid on a Surface. Note how the fatty acids form in polarity and provide a safety device for the oil film

mineral oil is allowed to run dry or to be overloaded for a short time, so that the oil film is ruptured, seizure will most probably occur at once. Suppose that a safety medium is interposed between the two metallic surfaces, a sort of shock absorber, having sufficient lubricating capacity to carry over a temporary shortage of oil, it would not then be necessary to use a large margin of safety in the oil itself.

### This Safety Medium is Boundary Lubrication

It is some intermediate stage between metal and oil. The reason for this deduction is that different

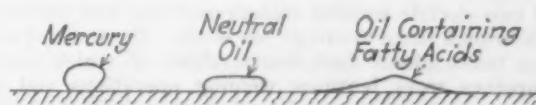


Fig. 7.—Effect of Surface Tension on Spreading

metals have some effect on the action. Experiments almost invariably show that the effect persists so that the film cannot be wiped off.

The acceptance of the fact that a boundary film is caused by free fatty acid content, and that the oil acts

\*Chartered civil engineer; oil expert, Ridley Park, Pa.

as a carrier, originated in the work of Wells and Southcombe, who replaced the large amount of saponifiable oils or fats in a compounded oil by a small amount of the "active principle." This substance, the germ, may consist of polar molecules which arrange themselves as would a number of magnets. The active group at the end of the acid molecule carries a negative charge, so that we might visualize all these ends pointing toward the metal surface and starting some chemical change on it. The thickness of this molecular layer is, say, a millionth of an inch, but it is there all the same.

The tendency of such a film is to spread over as large a surface as possible, like iron filings dusted over the pole of a magnet. Each element comes as close as possible to the surface so that, when there is an excess of the active elements, they pile up in small mounds rather than form a complete thicker layer. This mounting up is interesting, as it is peculiar to oils containing fatty acids. It is reasonable to assume that the safety valve action of the boundary film is due partly to this formation. In fact, De Stanton, in his report on the carrying capacity of oil films of small arc of contact, concluded that the loads sustained were enormously greater than could be supported by bearings of the usual form.

Langmuir and Deely both suggest that there is a direct intermingling at the boundary which might be visualized as a surface of plush. No matter what may be placed above the plush or in what irregular order, bundles of sticks for example, which might indicate mineral oil molecules, the film will remain.

Adsorption, meaning colloidal concentration at the surface, suggests that there might be some action such as takes place when soap is dissolved in water. The active group at the end of the fatty acid molecule will dissolve in water and, supposing there were no dispersion, a film of soap would form on the surface of the water. This would remain when the soap itself was removed, the spread of the film depending upon the surface tension between the two substances.

Figs. 1 and 2 show that the coefficient of friction falls rapidly when the first small addition of fatty acid is made, so that  $\frac{1}{2}$  per cent produces a reduction of friction of 20 per cent, under certain conditions. The weight of a drop of oil in water decreases uniformly as the fatty acid content is increased. Up to a certain point, the weight is a function of the surface tension between oil, glass and water, when a glass tube is used. When metals are used the results are generally similar, so far as present knowledge goes.

## TRAINING WELDING OPERATORS

### Cleveland School Gets Good Results—Students Under 25 Years of Age Preferred

Increase in the use of gas and electric welding is causing a constant demand for more trained welders, and the supply has not yet caught up to the demand. In addition there is a growing demand for welding supervisors for both gas and electric welding—men whose duties are to keep plant equipment in repair, decide the welding method best adapted for repair work and who are responsible generally for all welding done at the plant. Unlike most of the other metal working trades, there is said to be no such class of employment as welders' helpers, from which welders can be recruited, and manufacturers are not inclined to tie up their welding equipment in training new men for welding work.

Consequently, the opportunity to learn welding outside of schools is rather limited and a score of welding schools are being conducted in various parts of the country. One of these which appears to be doing very successful work in the practical training of both oxy-acetylene and electric welders is being conducted by the Cleveland School of Technology, which is conducted by the Cleveland Y. M. C. A. In addition to giving practical instruction to young men not having physical handicaps, the school, in cooperation with the Ohio State Bureau of Industrial Rehabilitation, is making welders of men who have met with accidents that have caused permanent disabilities and are no longer fitted for heavy work. Men who have lost fingers in punch presses and even some who have lost an entire hand have been restored to industry as good wage earners by converting them into welders. These are being used mostly for light bench welding.

The school is in charge of R. K. Randall, who had several years of practical experience in welding work. Classes are conducted in both gas welding and cutting and electric welding, and accommodations are provided for ten oxy-acetylene students and one electric welding student in each class. There is one gas welding class and two electric welding classes each day and classes in each branch three evenings per week. The work of each class takes about four hours, three of which are in laboratory work learning welding operations and the fourth hour is taken up with a lecture. Standard Davis-Bournonville, Ox-weld and Torch-weld gas welding equipment is used. The electric welding department is provided with a 150-ampere Lincoln arc welder.

Since August, 1922, 156 oxy-acetylene and 42 electric welders have been trained in the school. The average course of instruction is 65 hr., that being the average time that it takes a young man to attain certain efficiency in his training that makes him qualified to take

a position. The school usually helps its students to obtain work and finds that a young man who has taken a course can get along on the job fairly well at the start provided he has a reasonable foreman who does not expect too much from a beginner. Young men from 18 to 25 years prove the best students. Men over 30 are not advised to take the course as it is found that as a rule they do not develop into good welders.

#### Gas Welding Taught Progressively

Pupils in the gas welding department start their instructions with welding a  $\frac{1}{8}$ -in. sheet steel in flat, vertical, horizontal and overhead positions. This is followed by work in welding  $\frac{1}{4}$  to  $\frac{1}{2}$ -in. sheets. Then they are given cast iron welding and in this connection are taught the principles of contraction and expansion.

After becoming fairly efficient in this work, they are given two large pre-heated castings to weld under actual shop conditions, the work up to this point being done without pre-heating. The next instructions relate to malleable iron. The pupil is first taught to tell malleable iron from cast iron and steel by looking at the cross section of a break and applying the flame, distinguishing the material by the sparks. He is taught how to apply the brazing process and in this connection it is explained to him why it is impossible to weld malleable iron. Then the welding of cast aluminum is taken up, the instruction being practically the same as for cast iron welding. The pupil is taught to build up pads so as to become familiar with the use of the paddle and learn how to control the metal. After this training he practices on welding pre-heated aluminum crank cases. Quite a few of the pupils have had experience in steel and iron welding and take the course to learn brazing and aluminum welding. No instruction is given in copper and sheet aluminum welding as a welder can pick this up easily afterward.

#### Arc Welding Students Start on Flat Work

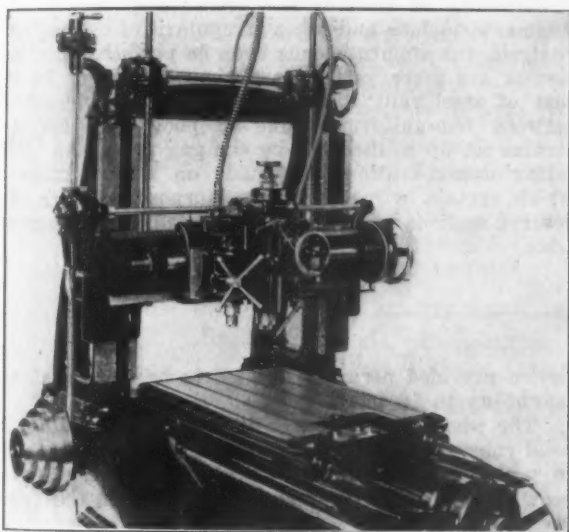
The students in electric arc welding start with flat beaded work on sheet steel from  $\frac{1}{4}$  to  $\frac{1}{2}$ -in. in thickness and then are taught to build up pads. Following this they are trained to weld plates set at vertical and overhead positions so that they will become familiar with the arc in any position. Then they weld seams in the various positions and are given building up work on shafts and finally are given instructions in electrically welding cast iron. In connection with electric welding, talks are given on the theory of welding, on the proper study of welding jobs, etc., and various types of electric welding equipment are described. A limited amount of commercial welding work is taken into the school and this gives the pupils who are far enough along, the opportunity to combine practical experience with their training. Of the pupils who have taken the course about 60 per cent have stuck to the welding trade after leaving the school.

### Attachment for Swiss Jig-Boring Machine

The accompanying illustration shows a special attachment for use on the larger size jig-boring machine of the Societe Genevoise d'Instruments de Physique, Geneva, Switzerland, for the drilling and boring of holes up to 0.2 in. in diameter, without moving the work on the machine. The attachment, which is being marketed in America by the R. Y. Ferner Co., Washington, D. C., consists of a second drilling spindle mounted on the same slide as the main boring spindle, at a fixed distance from the latter.

The drill spindle is driven by flexible shaft connected to the main drive by a friction clutch coupling and is controlled by a lever. The vertical feed of the drills is 1.6 in. This is measured by a graduated scale on the attachment and read by an index on an adjustable clamping ring which may be set to limit the depth of hole. The feed to the drill is controlled by a rack and pinion operated by a cross handle.

The drills are held by a conical chuck which is tightened by a tube extending through the spindle and controlled by a knurled head at the upper end. Small



Drilling Attachment for Use On Jig-Boring Machine. It is mounted on same slide as boring spindle, as shown

drills being subject to considerable vibration at the high speeds, which may be as much as 2000 r.p.m., a special form of guide has been provided to hold the lower end of the drill in place. The drill turns within a hardened bushing and conical point.

The attachment is for use on the company's Nos. 4 and 5 machines, which have capacities for jigs 18 x 24 x 20 in. and 24 x 32 x 26 in. respectively.

### Powdered Coal for Power Plant Boilers

Tests were made by the Bureau of Mines at Oneida Street power station, Milwaukee, to determine the value of pulverized fuel for power plant use. There were 36 tests made on a 468-hp. Edgemoor boiler using Illinois coal. Twenty-nine of the tests were of 24 hr., and the shortest were of 12 hr.

Among the results it was found that efficient combustion can be obtained without pulverizing the coal to the extreme fineness of 85 per cent through a 200-mesh screen, which has been recommended heretofore. Completeness of combustion seems to be more a matter of proper furnace and burner design and air supply than of coal fineness. Another point brought out was that coal with as much as 8 per cent moisture will burn as completely as when it is dried to 1 per cent. Losses due to moisture in the coal increased at the rate of 0.1 per cent for each 1 per cent increase of moisture.

Temperatures as high as 2700 deg. Fahr. were obtained in the combustion at about the point where the flame bends upward. The effect of temperature of the

furnace lining on the abrasion of the brick walls was studied and it was found that a temperature gradient running up to 2650 deg. at 10 in. thickness was very destructive, while with a gradient not exceeding 2300 deg. for the same thickness, it was not destructive.

Details of the tests and discussion of the results, together with diagrams, sections of the apparatus, etc., are contained in a 92-page pamphlet, Bulletin 223, issued by the Bureau of Mines, Washington. The work was carried on by Henry Kreisinger, John Blizard, C. E. Augustine and B. J. Cross.

### Making Steel from Cast Iron Without Fuel

Each week the *Engineer* (London) publishes some extracts taken from the files of the same publication of 60 years ago. In the issue of Jan. 15, 1864, reference was made to a paper presented by Henry Bessemer before the British Association at Cheltenham and bearing the title given to this note. Before being read, the paper was subjected to much scoffing, but after the details had become known, metallurgists present expressed their sense of the importance of the process described. Some of the preliminary experimental work performed by Mr. Bessemer is described in the following paragraphs.

"Although he was not an ironmaster, nor trained to the routine of ironmaking, he argued that as decarbonization of pig iron was the essential factor in converting it into malleable iron, it would be better to bring the oxygen into contact with the iron than the iron into contact with the oxygen, as was done during puddling. Obtaining a small, powerful blast engine and a quantity of pig iron, he proceeded to test his idea at Baxter House, St. Pancras.

"A vessel lined with fire-clay was prepared to receive the molten metal delivered from a cupola, and to it a supply of high-pressure air was fed. The mouth of the vessel was partially closed by an ordinary cast iron pavement coal-hole cover suspended by a chain. The metal had not been long in the converter, however, before the cover and a large part of the chain were dissolved by the intense heat liberated by the decarbonization process. The air cock was too close to the converter to permit its being approached by anyone with the object of shutting it, but the 'fury of the decarbonization' subsequently subsided of its own accord—before, it is stated, the fire-engines arrived. The result of the experiment was unknown, but was such as to encourage the inventor to proceed.

"On a second attempt the product was unmistakably steel."

### Commercial Statistics for 1922

In a 1400-page volume the statistical division of the board of Engineers for Rivers and Harbors—a branch of the War Department—has published details of water-borne traffic entering all the ports of the United States. Much of the information is detailed by years, by tons, and by value. For the more important ports, details are given of commodities by groups and classifications, although the sub-division along these lines covers the latest years only. The grand total of all commerce at Atlantic, Gulf and Pacific ports shows that our foreign commerce is less than half our total water-borne commerce.

### Simplification of Hot Water Storage Tanks

At the meeting held Jan. 28 at the Department of Commerce, the manufacturers of hot water storage tanks submitted to the Department's Division of Simplified Practice, tentative recommendations covering sizes and dimensions of these commodities. These recommendations, if generally adopted by manufacturers, distributors, and users of these tanks, will represent a reduction from over 250 varieties as now made to five standard sizes and two working pressures.

## MAGNETIC TESTING OF STEEL

### Distinguishing Proper and Improper Heat Treatment—Refinements in Determining Homogeneity

Some late developments in the application of magnetic analysis to the testing of steel can be recorded. Announcement of them was made recently to representatives of the technical press on the occasion of a visit to the laboratory of the Burrows Magnetic Equipment Corporation, Jersey City.

The work of Dr. C. W. Burrows, particularly in the use of magnetic analysis to determine the homogeneity of steel, has been known for some time. In the last two or three years, however, Dr. Burrows has been devoting a large share of his time, under the auspices and with the assistance of the Federated Engineers Development Corporation, to magnetic analysis as applied to the heat treatment of steel. According to the demonstrations made in the laboratory on the occasion mentioned, the efforts in this direction have been successful. It now can be said that apparently magnetic analysis will disclose whether heat treatment has been good or bad and also that it reveals variations in the degree of the treatment.

Of the several demonstrations made probably the most interesting was that of the ability of the apparatus as now perfected to distinguish between the quench and draw of certain alloy steels. Rods of chrome-molybdenum steel which had been quenched at a certain temperature and then drawn at lower temperatures, 50 deg. apart, were submitted to the test, one of them

being used as the standard. The apparatus distinctly indicated the differences occasioned by the drawing at the various temperatures 50 deg. apart.

Another test was of a group of saw blade blanks. In this case not only the homogeneity of the steel but the variation occasioned by too high or too low temperature in the heat treatment process was plainly observable. A special apparatus was also shown by which it was claimed the operator could detect cracks along the edge of the saw where the teeth are usually cut.

Apparatus for determining depth of case and heat treatment of pinions for automobiles was also demonstrated, the unique feature being that both the depth of case and the reliability of the heat treatment could be determined by the same mechanism. The application of magnetic analysis to other forms of steel for determining the degree of heat treatment was also explained.

Dr. Burrows states that it is now possible to employ magnetic analysis on a commercial scale for determining not only the homogeneity of steel but also the proper heat treatment, also by the same means to distinguish large from small grain size in heat-treated steel.

Since the first work on the determination of the homogeneity of steel or the presence of segregation, sonims, inclusions and other irregularities by magnetic analysis, the apparatus has been so perfected that the results are more satisfactory than formerly. In the case of steel rails it is now possible to differentiate between non-uniformity due to poor steel and the strains set up in the rails by the gag press. An interesting demonstration was made on a wire cable in which certain wires had been purposely broken, the severed sections being clearly indicated by the magnetic tests.

### Small Crane Truck and Tractor

The gasoline industrial truck and tractor illustrated, known as the Duat and said to be the smallest unit of its class, has been placed on the market by the



The Crane Attachment May Be Mounted Without Use of Tools. It will lift and carry up to 2000 lb. The turning radius is 52 in.

Clark Truactor Co., Buchanan, Mich. The machine is intended for the loading and unloading of box cars, the lifting and towing of loads through narrow factory aisles and for interplant haulage.

The machine pivots on one wheel and has a turning radius of only 52 in. It is rated to tow from 7 to 10 tons or from one to 20 trailers, depending upon the condition of the factory floor or yard. The crane attachment may be attached without the use of tools and will lift and carry loads up to 2000 lb. A brake

device provided permits the load to be carried at any height up to 56 in.

The wheels are 16 in. in diameter and have 3½ in. solid rubber tires. The machine has a wheelbase of 40 in. with a tread of 33 in. A brake beneath the driver's seat automatically stops the machine when the driver dismounts.

### Patent Office Makes Progress

WASHINGTON, Feb. 5.—Due to its increased personnel and reorganization of work, the Patent Office, according to a report for the calendar year 1923, submitted to Secretary of the Interior Work and to the Senate and House of Representatives, is making a gain at the rate of 1000 per month in acting upon applications for patents, designs and trademarks. At the same time, the addition of new employees to take care of greatly increased business has resulted in the congestion of space in the antiquated building now occupied by the Patent Office, in which the conditions are described as "deplorable."

Through coordination of work and elimination of duplication, together with other economies, expenses in operation during 1923 were reduced by thousands of dollars. It is believed that the gain made in the rate of cases being handled will increase rather than decrease as the force becomes trained. There are, however, now on hand 67,000 patent cases, 900 design cases and 2100 trademark cases awaiting action. Even with a gain of 1000 cases per month, the report says, it will be five years before the technical work can be current. To accomplish this within a reasonable time the force would have to be augmented by at least 100 more examiners.

The United States Civil Service Commission announces examinations for radio engineers to fill vacancies in the Signal Service, McCook Field, Dayton, Ohio, and Camp Alfred Vail, N. J. Application blanks may be obtained from the commission at Washington, or at post offices or custom houses.

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# THE IRON AGE

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## Common Sense on Trade Associations

WE have referred to the recent exchange of correspondence between the Secretary of Commerce and the Attorney-General, following the handing down of consent decrees in two Federal district courts in the tile-makers' and cement producers' cases, and to the disturbance created in the minds of many industrial and trade association members. By virtue of that alone there may be serious and unfortunate consequences in the form of interference with, or check to, the economic work of such associations, the development of which has been the most important movement toward the establishment of equilibrium in industry. It was unnecessary that this should happen. The whole business has been badly handled in Washington. What has been needful, and still is needful, is the banishment of hysteria and the exercise of common sense.

The Sherman law prohibits actions in restraint of trade. It aims to preserve free competition. In the nature of things such principles could not be expressed in aught but general terms. Equally in the nature of things such an expression was bound to afford ground for controversies, which coming into the courts were met long ago by the wise declaration of our highest court that the law must be interpreted by the rule of reason.

If an industrial and trade association makes its statistical operations serve as a restraint upon competition among its members it violates the law. If it does that no transmission of its reports to the Department of Commerce either helps or excuses it. Nor would any publication of them in a newspaper. The dictum of the Attorney-General that trade associations may not distribute their reports directly to their members but may to the Secretary of Commerce for distribution by him is silly.

That the collection by an industry of statistics for its own information, which are merged in economic totals, is not a restraint of competition can no more be questioned than that the newly fallen snow is white and innocent. Without any doubt the honest associations (and most of them are honest) could go much further in their work than they have done, and would have done if they had not been frightened by the talk and threats

of bureaucrats. There is no reason why they should not distribute their reports to their members and no reason why they should send them to the Secretary of Commerce except as a courtesy to assist him in drawing the general economic picture of national industry that he desires to give. This is but common sense.

The recent fuss over this matter has had the effect of frightening a good many innocent and commendable associations. There is talk of getting legislation by Congress to clarify their position. We urge them to think twice or thrice before moving in that direction. Any invitation to Congress to take a hand might easily develop real dangers. In fact, the situation already has been clarified by the concentration of a multitude of legal minds upon a subject that previously had not received general attention.

It is unfortunate that all of the legal decisions up to date have been in cases of equivocal associations. It will be unfortunate if more light is sought merely by carrying either of the recent consent decrees up to the Supreme Court, by which we do not mean to prejudge those parties. What we do mean is that if it be deemed necessary to have any further clarification of the position—and probably it will not be unless to preclude vindictive attacks—the way to do it is to start a test case in the instance of some association whose work is unmistakably economic and unrestraining, as it is with 90 per cent of the associations. A decision by the Supreme Court in such a case, which as yet there has not been, would settle the thing once and for all.

## A Forward Step in Magnetic Testing

MAGNETIC analysis in the testing of steel has now been carried to the point of differentiating not only between non-homogeneous and homogeneous steel but also between good and bad heat treatment. Several investigators in recent years have aimed at the latter objective. At Atlantic City last June results of such testing as applied to drills were made public, supplementing the same investigator's work on the determination of the depth of case of chains, presented one year previously. The latest results, as given on another

age, exceed anything heretofore attained. Not only is depth of case measured but differences of deg. of drawing temperature after a definite quench are detected. Dr. Burrows announces also that refinements in indicating the homogeneity of steel are now possible, particularly in the case of rails. The making of apparatus that is capable of commercial use, which is the next step in magnetic analysis, would mean the non-destructive testing of railroad, structural and other steels in large tonnages—a goal long sought.

### Stocking Unfinished Steel

**B**EFORE the war the alinement in steel mill facilities was always that there was an excess of steel rolling and finishing over steel-making capacity. The fact was well recognized, but no precise estimate was attempted as to the amount of the excess. Guesses were sometimes hazarded that it was 15 or 20 per cent. When the war-time demand for shell steel came there was much building of open-hearth furnaces, and it looked as if the steel-making capacity would come to exceed the steel-finishing capacity. Recent experiences, however, have indicated that there is still an excess of finishing capacity, though probably not so large an excess as before the war.

If the alinement at individual plants resulted from definite planning, the underlying theory rested on two considerations—that the relative demand for different mill products varies from time to time, so that finishing mills would not all be under equal pressure to make deliveries at any given time, and that the capital investment is much less in finishing equipment than in steel-making equipment, when the latter involves pig iron, ore and coke-producing capacity.

It was the common experience before the war that when steel became scarce it became scarce as steel rather than as any particular finished form of steel. If any finished steel product had a relatively light demand it was allotted correspondingly less steel, because other finishing mills could use more. The working out of this principle was seen in prices, which moved up and down quite closely together.

There was an opportunity to stock steel in times of light demand, in the form of ingots and semi-finished, and work the steel off in times of heavy demand, but the opportunity was never utilized to any extent. Such a policy, however, seems now to have been adopted by one or two important steel producers, which lately have been operating steel-making units at higher rates than finishing departments, and besides stocking ingots and semi-finished steel have been stocking some pig iron.

It is impossible for the steel industry to carry any considerable stocks of finished product. Sizes and descriptions vary so that stocks would be unwieldy, and the expense of handling is considerable. Recognized exceptions are in nails and tubular goods. Nails are easily handled, and the consumption of individual sizes is very heavy. In pipe the normal and most efficient operation is to produce for stock and ship all orders from stock.

These lines, however, represent only a small proportion of the total finished steel output.

The major portion of the finished steel produced is made from steel that has never grown entirely cold from the time the ingot solidified. To stock such steel means reheating, or added expense, but the expense is not large. Sheets and tin plates, however, comprise between 15 and 20 per cent of the total rolled steel produced, and their raw material, sheet bars, always grows cold. The specifications are not so varied but that stocks readily can be carried. The only extra expense is the small cost of handling and the interest on the cost of production.

Just as the last dollar of income pays the heaviest tax with the graduated income tax, so the last unit of manufacturing capacity installed is the least often operated and the most expensive to carry. Assuming for argument that \$1,000 investment represents 15 tons steel-making capacity a year, and the investment is used one-half the time, the capital cost at 6 per cent is \$8 per ton. Obviously a ton of steel made with equipment that otherwise would be idle can be carried many months and be handled several times before it has accumulated an extra expense of \$8. Thus the policy of stocking ingots and semi-finished steel has much to commend it.

### New Practice in Metallography

**T**WO important developments in metallographic analysis have been announced in recent months. One is conical or indirect illumination of the specimen under examination and the other is the effect of very high power magnification. Reference to the results secured with the former appears elsewhere in this issue, being based on a paper presented at the last annual convention of the steel treaters at Pittsburgh; high power magnification is dealt with in a recent contribution to the official publication of the same society.

Conical illumination, whatever its merits, is a unique development. The results are a truly beautiful picture of the structure of the steel. The chief advantage is ability to bring out depressions and elevations in the crystal formation which are entirely indistinguishable by direct illuminating methods. More details as to the formation and orientation of crystals, their slip and deformation, and more light on grain boundaries and the effects of certain heat treatment processes are among the likely results.

As to high power, methods of polishing and etching have been so perfected that, with the aid of certain apparatus and photographic equipment, magnifications up to 9000 diameters have been obtained. These have revealed beautiful crystallizations which throw new light on problems in metal structure and the effect of various hot and cold-working processes.

Metallurgists differ as to the value of these two developments. Some claim many advantages for them and some are inclined to doubt. As with other new departures, perhaps their true value is yet to be determined. There is much discussion at present regarding metal structure and the causes of hardness. Conflicting theories are cur-

rent, but one of the most plausible has been developed by American metallurgists. While X-ray crystal analysis is a most important factor in this study, it is not unlikely that one or both of the new developments referred to will be of important aid in the solution of these problems.

### Jolts for the Attorney-General

THE Department of Justice, in its pursuit of business organizations and business men who have rendered distinguished service to their country, has had several important reverses within a few days. The Supreme Court of the District of Columbia, in sustaining the demurrers of Benedict Crowell, formerly Assistant Secretary of War, and six others indicted with him in cases growing out of the building of war-time cantonments, did not pass upon technicalities but declared that everything done by Mr. Crowell and his volunteer aids was lawful. To those who had long known of Mr. Crowell's honorable record in the iron ore trade and in other businesses, this decision was not less than had been expected. It is a satisfaction to have from this high source such a vindication of men who won the gratitude of the nation by their splendid work in getting troops and munitions to France against tremendous obstacles.

In another case which the Department of Justice has actively prosecuted, that against the New York Coffee and Sugar Exchange and the New York Coffee and Sugar Association, the decision of the Supreme Court of the United States is a complete denial of the claims of the Government. In view of the recent agitation in regard to the rights and powers of trade associations, one sentence of the decision is especially significant. Chief Justice Taft said: "What the Government really asks us to do is to exercise legislative power rather than judicial power." In his recent correspondence with Secretary Hoover, Attorney-General Daugherty, by putting his own interpretation on the Sherman law, attempted in effect to exercise legislative power. He has gone further than Solicitor General Beck did in his argument in the Hardwood case, in which he contended that the collection and distribution of statistics would not be illegal unless connected with a price agreement, an agreement to curtail production, or some other illegal act.

It is not surprising that the Attorney-General's indefensible holdings concerning the publication of business statistics have given much less concern to trade association officers since these recent Supreme Court estimates of some of the activities of his office.

PUTTING well what thinking men believe, Dr. Nicholas Murray Butler, president of Columbia University, at the annual dinner of the American Engineering Council, said that "What we want, what the people of this country and the world want is more emphasis on administration and less on legislation; more on the engineer and less on the law-making power. We write," said he, "14,000 or 15,000 laws every year and violate 12,000 every day of necessity—and a great many

people believe that we have made political progress. On the other hand, the real field for progress is the field of administration." Business will join with Dr. Butler when he says: "We must leave off artificial law-making and emphasize public administration, develop administrators, put them in their places, give them opportunity, hold them responsible and remove as fast as we properly can such artificial barriers as exist between the people and the expression of their will and the carrying out of their will."

IMPORTS and exports for 1923 show that a little over one-fifth more materials for manufacturing and more manufactured articles, partly or completely made, came in than in 1922 (measured by value of products), and that not quite one-fifth more than in 1922 were exported. In short, the expansion in exports of things other than food products nearly kept up with the increase in imports. The movement both ways of raw materials and partly manufactured goods showed somewhat greater expansion than that (also both ways) of manufactures ready for consumption, with the average, as stated, of about 20 per cent. Imports of other than food products in 1923 totaled 2.878 billions of dollars and exports 3.244 billions.

### The Iron Age and Its Readers

HAPPY is the speechmaker who stops talking when his audience has a strong desire to have him go on. The same may be said of the editorial writer, and THE IRON AGE feels complimented by the suggestion of an esteemed reader that the last three paragraphs of an editorial recently published in its columns be expanded into an article which in the language of the subscriber "would give the story of some of the boldest adventures in recent years in industrial development and would visualize such leads as Irondale, Missouri, and the Temescal mine." The editorial in question was "An Interpretation of Henry Ford" and included references to Mr. Ford's hunt for lead in the Irondale district and to what his limitless resources might bring forth if spent on winning tin from the Temescal. We grant that the suggestion is a good one for a popular magazine; there is a lead in it to a thrilling story on "What Henry Ford Might Do."

Employment in Cleveland during January showed a slight increase over December, according to the monthly report of the labor relations committee of the Chamber of Commerce. Total number of employees in 100 factories on Jan. 1 was 88,400 as compared with 87,802 Dec. 31 and 87,358 Nov. 30. Automobile plants increased their working forces 15 per cent and there was an increase of 1.7 per cent in plants making iron and steel in their products.

Sales of mechanical stokers, according to the reports of 15 manufacturers to the Department of Commerce, amounted in 1923 to 1464 for a total of 730,446 hp. In December sales were made for 32,517 hp., about twice the business of November, nearly as much as that of October and making the monthly average for the year 60,870 hp.

# Iron and Steel Markets in Europe

Continental Competition Hurting England—Higher Prices  
on Continent—Price Cuts Reported  
from Germany

(By Cable)

LONDON, ENGLAND, Feb. 5.

IRON and steel outlook is obscure, offerings of Continental pig iron resulting in increased business, but the Cleveland makers are unable to meet the competition, owing to high costs. Prices meanwhile are unchanged, though reductions are considered necessary in other quarters, which expect banking of furnaces.

Hematite is weak. The supply now exceeds the demand and stocks are accumulating. Makers are anxious for orders. Foreign ore is more active and fair quantities of Bilbao Rubio have been sold at 24s. to 24½s. (\$5.16 to \$5.27) c.i.f. Tees. Sellers of North African ore ask 21s. to 23½s. (\$4.52 to \$5.05) c.i.f. Tees.

Finished steel is dull as regards exports. Domestic buying is broadening in certain directions, mainly structural engineering. India has bought a good line of shipbuilding steel, but merchant business is still poor. The Continent is inquiring for moderate tonnages.

Continental position is complex. Some works, apparently anxious for orders, quote cheap prices. Others are inclined to advance quotations. Wire rods are being sold at £7 15s. (\$33.33) f.o.b.

In France 125 blast furnaces were blowing Jan. 1, as against 119 on Dec. 1.

In Germany the Rheinische Stahlwerke has secured a Swedish rail order of 17,500 tons, in competition with French and Belgian makers.

Tin plate is steady, but sales are somewhat restricted. Makers are well sold to the end of March. They are quoting about 24s. (\$5.16) basis, IC, f.o.b. Export buying is rather quiet. The official figures for Welsh output in 1923 of tin plate and black plates was 17,229,790 boxes.

Galvanized sheets are in strong demand on Indian account for merchants and consumers. Heavy tonnages have been sold for February and March. Most works are quoting for April. Prices are unchanged.

Black sheets are in improved demand for the Far East. Japanese specifications are being sold at £21 5s. (4.08c. per lb.) f.o.b., March and April. Other markets are quiet.

## GERMAN IRON PRICES BEING CUT

Efforts Made to Meet French Competition—  
Freer Exports and Imports Sought

(By Radiogram)

BERLIN, GERMANY, Feb. 4.—The market is weaker, owing to severe French competition. Dealers in rolled materials who have large stocks on hand are under-selling producers.

The Pig Iron Association has decided to cut prices by between 5 and 10 per cent. Iron founders have announced an all-around 10 per cent price cut. The Association of Tube Manufacturers has announced a 20 per cent cut.

Steel works in unoccupied Germany are forming an association for defense against French dumping. The government has decided to permit the free importation and exportation, without license, of pig iron, semi-finished material and rolled goods. Cutlery manufacturers demand also the removal of the prohibition against the importation of fine steel.

## FRENCH MARKET UNCERTAIN

Unsettled Exchange Paralyzes Business—Semi-Finished Steel in Heavy Demand

PARIS, FRANCE, Jan. 25.—The French market is living through the uncertainty caused by the unsettled conditions of exchange. Not only is business paralyzed by the excessive rates of sterling and dollar, but also by their instability. There is no other way of straightening our monetary position than that of establishing the equilibrium of our budget on a balance which for

Prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at \$4.30 per £1, as follows:

Durham coke, delivered	£1 16s.		\$7.74
Bilbao Rubio ore	1 4		5.16
Cleveland No. 1 foundry	5 1		21.71
Cleveland No. 3 foundry	4 19½		21.39
Cleveland No. 4 foundry	4 16		20.64
Cleveland No. 4 forge	4 15		20.43
Cleveland basic	4 17½		20.96
East Coast mixed	5 2		21.93
East Coast hematite	4 19	to £5 0s.	21.29 to \$21.50
Ferromanganese	17 0		73.10
Rails, 60 lb. and up	9 0	to 10 0	38.70 to 43.00
Billets	8 0	to 8 10	34.40 to 36.55
Sheet and tin plate bars,			
Welsh	8 18½		38.44
Tin plates, base box	1 3¾	to 1 4¼	5.11 to 5.22
Ship plates	9 15	to 10 5	1.87 to 1.97
Boiler plates	13 0	to 13 10	2.50 to 2.59
Tees	10 0	to 10 10	1.92 to 2.02
Channels	9 5	to 9 15	1.78 to 1.87
Beams	9 0	to 9 10	1.73 to 1.82
Round bars, ¾ to 3 in.	10 10	to 11 0	2.02 to 2.11
Galvanized sheets, 24 g.	18 7½	to 18 10	3.53 to 3.55
Black sheets, 24 gage	13 15	to 14 0	2.64 to 2.69
Black sheets, Japanese			
specifications	15 5		2.93
Steel hoops	12 10	& 12 15*	2.40 & 2.45*
Cold rolled steel strip,			
20 gage	17 12½		3.39

\*Export price. †Ex-ship, Tees, nominal.

## Continental Prices, All F. O. B. Channel Ports

	(Nominal)	
Foundry pig iron:		
Belgium	£4 2½s.	\$17.74
France	4 2½	17.74
Luxemburg	4 2½	17.74
Billets (nominal):		
Belgium	5 10	23.65
France	5 10	23.65
Merchant bars:		C. per Lb.
Belgium	6 12½	1.27
Luxemburg	6 12½	1.27
France	6 12½	1.27
Joists (beams):		
Belgium	6 7½	1.22
Luxemburg	6 7½	1.22
France	6 7½	1.22
Angles:		
Belgium	8 0	to £8 5s. 1.54 to 1.58
½-in. plates:		
Belgium	7 15	1.49
Germany	7 15	1.49
¾-in. plates:		
Luxemburg	7 15	1.49
Belgium	7 15	1.49

some time cannot take into account the improbable payments of Germany. The financial projects of the Government based on these lines have been accepted here with a feeling of satisfaction; it appears necessary, however, that the new fiscal program shall not overburden the heavy charges already imposed on industrials. The rate of discount of the Bank of France has again been raised one-half point during the last fortnight.

Among other financial projects which are to be discussed today at the Chamber of Deputies is that authorizing the Minister of Commerce to suspend by decree all importation of goods that are not absolutely necessary to the life of the country.

Domestic demand is dull and prices unaltered, as they are but slightly influenced from outside. If a fall should occur next month in the price of metallurgical coke, this could not have any reaction on prices, as the cost of living, salaries and prices of raw materials purchased abroad have been raised in large proportions of late. It is therefore wise not to enter forward contracts.

**Coke.**—Arrivals from the Ruhr are irregular, owing to the station in Aix-la-Chapelle being obstructed. Nevertheless, the quantities received are getting larger, 177,266 tons, or a daily average of 8058 tons, for the first 22 days of the month, through Ehrang and Aix-la-Chapelle. In November the Société des Cokes de Hauts-Fourneaux was able to distribute to the plants 76.35 per cent of their consumption capacity; in December, this percentage reached 88.60. The formation of the society for the distribution of German coke, which is to take the place of the SCOF in France, is not fully adjusted yet but will very likely be so before the end of the month. Up to now, the price has not been given out, as no agreement has been reached between the French Government and the German industrials. The latest news is that a rebate of 5 gold marks has been applied, bringing the price to 31.40 gold marks, or at the present rate of exchange 166 fr. (\$7.47). If this is accepted by the Government, the French iron and steel makers will at least know what to stand by; we must, however, add that the price of German coke will thus be 20 fr. higher than French coke.

**Iron Ore.**—The extraction of ore remains on the same level and stocks are being lowered slowly. With the Germans, the renewal of contracts is actually being discussed, but shipments are not yet resumed. Our transactions with Great Britain are larger, important dealings are being concluded with South Wales, and a few sales outlined with Scotland; plants of the Cleveland district seem to be interested in French ores.

**Pig Iron.**—The production of pig iron continues to increase while inquiry remains weak; in fact, due to the high rates of sterling, prices are firmer than during the past week and the average quotation works out between 380 and 390 fr. (\$17.33 and \$17.78 per gross ton); a founders' cooperative association, however, is offering Homecourt No. 3 at 375 fr., Longwy, 385 fr., Raty 390 to 395 fr. In the Western region, Trignac enhances the phosphorus of its iron to 0.50 per cent, in order to give more fluidity, and quotes 380 fr. at works. Prices for hematite are subject to much variation, according to region, while generally steady, and range between 420 and 440 fr. (\$19.15 and \$20.06) at works and 460 to 480 fr. (\$20.98 and \$21.89) f.o.b. For export, the Lorraine, in spite of the decrease of the franc, was making offers during the week on the basis of 410 and 415 fr. (Belgian) for No. 3 pig iron (at present rate of exchange, 0.91c., 373 to 377 fr., French) per ton (\$17.00 to \$17.20), f.o.b. Quotations for basic range 10 fr. lower. The f.o.b. price for foundry pig iron is 82s. (with the £ at 96 fr., 393.60 fr., French, or \$17.95).

**Ferroalloys.**—A revised price for ferroalloys, caused by the rise of sterling, is expected. Meanwhile, the prices for ferromanganese of 76 to 80 per cent Mn range between 1650 and 1700 fr. (\$75.25 and \$77.52), f.o.b.; spiegeleisen, 10 to 12 per cent Mn, 550 to 600 fr. (\$25.08 to \$27.36); 18 to 20 per cent Mn, 700 to 725 fr. (\$31.92 to \$33.06).

**Semi-Finished Products.**—This section shows little activity and prices are much discussed. A number of

plants with a large volume of orders ahead have withdrawn from the market and spot deliveries are obtained with difficulty. The inland quotations for basic steel per 100 kg. (220 lb.) are as follows:

	Fr.	
Ingot	44 to 46	\$20.06 to \$20.88
Blooms	46 to 48	20.98 to 21.58
Billets	50	22.38

The Lorraine and Luxemburg plants are hard competitors on the Antwerp market where the following are quoted:

	Fr.	
Blooms	510 to 520	\$23.26 to \$23.71
Billets	550 to 555	25.08 to 25.41
Largets	570 to 580	26.00 to 26.45

**Wire Rods.**—The market is dull at home but shows some improvement for export; prices are very much discussed. Some of the plants have a large volume of orders booked ahead and are quoting long delivery dates, while others are looking for orders. Wire rod is sold 70 to 72 fr. (\$31.92 to \$32.83), clear wire rod is obtained at 95 fr., (\$43.32), annealed 100 fr., (\$45.60). Wire nails, basis No. 20, 100 fr. Owing to the rise of spelter, galvanized is worth 125 to 130 fr. (\$57 to \$59.28).

**Rolled Steel.**—There is a good amount of orders on the market and prices show little alteration. Buyers, however, are prudent and not entering forward contracts unless guaranteed against a possible decline. There is no chance of any decline occurring shortly, which at any rate would be of small importance, as the elements of cost, particularly labor, will not be lowered before long.

Some concessions are obtained on joists for prompt delivery. The ruling quotation in East and Lorraine is around 54.50 and 55 fr. (1.11c. and 1.12c. per lb.) or 54, 53.50 and 53 fr. for large orders; and 56 to 58 fr. (1.14c. to 1.18c.) in the North. Lorraine quotes f.o.b. Antwerp, 540 fr. (French) per ton.

In rails, a few interesting orders have been booked of late, including 10,000 tons for Finland by a Lorraine steel works; part of an order for 9000 tons standard rails for Chile was delivered to a Franco-Belgian plant, with 5000 tons standard for the French colony Isle of Réunion, at 513.50 fr. (\$23.42) f.o.b. Havre and 584.50 fr. (\$26.65) for steel ties.

Merchant grades are quiet, with prices practically unchanged, at least nominally, as rebates are made occasionally to secure orders. Both sellers and buyers will not deal further ahead than March. Large sections are in favor and delivery times are quoted six to eight weeks for small and medium shapes. Domestic prices are as follows: Bars, 57 to 60 fr. (1.16c. to 1.22c.); 73 to 75 fr. (1.49c. to 1.53c.) for hot rolled hoops. A Meurthe-et-Moselle firm has taken 404 tons of round, square and flat steel at the average rate of 73.15 fr. per 100 kg. (1.49c. per lb.). For export, Lorraine is quoting 550 to 570 fr. per ton, (1.12c. to 1.16c.) f.o.b.

**Sheets.**—A good many orders have been booked in heavy gages, in the Saar especially, at 64 to 67 fr. (1.30c. to 1.36c.) basis. Medium is less busy, at 74 and 76 fr. per 100 kg. (1.51c. to 1.55c.) basis. The light gage market is heavy, with many offers and small inquiry, with a price between 85 and 94 fr. (1.73c. and 1.91c.) and 4 to 5 weeks' shipment; 14 mm. is worth 82.50 (1.68c.); 14.5 and 15 mm., 85 fr. per 100 kg. (1.73c.) f.o.b. Paris.

**Foundry.**—The situation is satisfactory, much activity being shown in the automobile trade, rolling stock and agricultural outfits; machinery is duller. Some brake blocks have been sold 64.50 fr. per 100 kg. (1.31c. per lb.); cylinders for segments in special foundry iron at 125 fr. (2.55c.); special steel castings at 238 and 250 fr. (4.85c. and 5.09c. per lb.).

A code of lighting, covering factories, mills and other work places, available in pamphlet form as bulletin No. 331 of the bureau of labor statistics of the Department of Labor and approved as a standard by the American Engineering Standards Committee, may be obtained at 10 cents a copy by applying to the Superintendent of Documents, Government Printing Office, Washington.

## BRITISH MARKET OUT OF GEAR

### Continental Competition More Potent Than Railroad Strike—World Shipbuilding Low

LONDON, ENGLAND, Jan. 24.—The position of the iron and steel markets has been somewhat put out of gear by the developments in the political situation, coupled with the most recent disturbance in the industrial world—the railroad strike. The resumption of trade after the holidays did not bear the fruit that was expected of it at the end of the year, but this has been in the main due to a pronounced revival of competition from the Continent, and the subsequent purchasing of large quantities of both pig iron and manufactured iron and steel from this source.

It is early to forecast any plans of the new Labor Government, but it is possible that, though protection as a political issue has been dropped, some kind of minor protection may be taken to help our iron and steel manufacturers. In fact, in certain influential quarters it has been stated that imports in certain instances may be prohibited altogether. A case in point is that many thousands of tons of steel from the Ruhr, which was seized by France, was sold to French dealers at ridiculous prices, and this material in turn was resold to British consumers at relatively cheap figures. It is, therefore, only natural that the iron and steel producers should kick.

So far the strike on the railroads has not materially affected the position, as the buying both for home and export has been on a poor scale for the last two or three weeks, but if it continues it will, of course, mean wholesale closing down of works. In one or two cases fur-

naces have been damped down through the inability to secure transport of fuel, and preparations are being made in other directions to take similar steps. Prices have not been affected, competition from Continental sources being of such a nature that makers have to reduce, if anything, to get any business, and the present price of Cleveland pig iron, which may be taken as the index of values, is about 99s., though probably this figure could be shaded for a good order.

Export demand for steel continues poor, but the domestic trade is active as far as the carrying out of present contracts is concerned, as there is a tremendous lot of work on hand in connection with the reconstruction schemes of the railroads, and with the building of new merchant tonnage, and for some specifications, such as light gage sheets, makers are sold until the early summer months.

#### Ship Launchings Small

The annual summary of shipbuilding, as published by Lloyds Register, shows that the decline in new shipbuilding in 1923 amounted to approximately 33 per cent. The world's launchings during the twelve months were 701 vessels of 1,643,181 gross tons. Of this figure Germany launched 358,273 tons; United States, 172,817 tons; France, 96,644 tons; Japan, 72,475 tons; Italy, 66,523 tons; Holland, 65,632 tons; and Great Britain and Ireland, 645,651 tons, or less than 40 per cent of the total. Compared with the record output of 1919, when over 7,000,000 tons were launched, the present total shows a large decrease of 5½ million tons. The portion launched in Great Britain and Ireland for owners residing abroad was only 18,846 tons, against in pre-war times about 20 per cent of the whole year's output.

## JAPAN HAS FIVE YEAR PROGRAM

### Schools and Bridges Projected for Yokohama—Foreign Pig Iron Appears Competitive in United States

NEW YORK, Feb. 5.—Dullness in trade with Japan continues unabated, as merchants there await something definite in the trend of political affairs. While the rumor persists that the tariff on iron, steel and building materials may not be reimposed on March 1, no official statement has been made. Chinese buying is extremely light and practically no activity is expected from this market for the next two or three weeks; the Chinese new year began Feb. 4. The small copper purchases that have been made lately are reported to have been placed in the London market, and on iron and steel items, the Continental prices are so much lower than the quotations of American sellers as to remove the question of competition almost entirely.

Local authorities in Yokohama, according to a report received by a prominent independent steel company from its representative in Japan, are contemplating the erection of 40 bridges within the city limits during the next five years. Six or seven of these may be built during the present year. As yet, however, no decision as to the type of material to be used has been made, whether structural steel or reinforced concrete. At present one school building of three stories, reinforced concrete construction, affording 36,000 sq. ft. of floor space, is projected for 1924. This is only a beginning, however, complete plans calling for the erection over the next five years of 117 schools at an average cost of \$150,000 each. It is expected that 24 buildings a year will be erected for four years, completion of the program coming in the fifth year, 1928. Most of the plans call for four-story steel and concrete structures.

#### German Steel Prices Higher Than Belgian

While Japanese buyers are undoubtedly purchasing only in a small way at present, some business is believed to be going to Continental sellers, in consideration of the lower market prevailing in Belgium and France. Based upon quotations obtained from Germany by importers in the United States, German sellers are apparently too far out of line with their present

quotations to obtain much business in competition with French and Belgian mills. One importer received a quotation from Belgium on an inquiry for mild steel bars that amounted to about 2c. per lb., duty paid, delivered Atlantic port, while the German price quoted on the same inquiry amounted to about 2.30c. per lb., c.i.f., duty paid. Part of the higher price of the German bars was the result of the higher duty exacted, 50c. per 100 lb., as the bars cost at the mill more than 1.50c. per lb. base, while the Belgian material, costing less than 1.50c. per lb. at mill, entered under a duty of 30c. per 100 lb. Rumors of purchases of foreign steel, in one case about 2500 tons of plates and in another 5000 tons of structural material, cannot be substantiated.

#### Importers Quoting on Continental Iron

Importers are still watching Continental markets and the eastern Pennsylvania and New England districts in the United States with a view to importing pig iron. While semi-phosphorus pig iron of Luxemburg quality can be offered at competitive prices, a standard, low-phosphorus foundry iron is as a rule too high to compete with the domestic product. A recent offer of a foundry iron by a British exporter, quoting on Continental iron, was competitive at the time, but has since become higher as a result of the rise in exchange of the pound sterling. This iron analyzed 2.50 to 3 per cent sil., 0.6 to 0.9 per cent man., 0.6 to 0.9 per cent phos., and a maximum of 0.5 of sulphur, and was quoted at 99s. 6d., c.i.f. Atlantic port, February-March delivery. At the time of quotation this would have been about \$21.65 per ton, duty paid, compared with a price today of about \$22.65 per ton, duty paid. The same British exporter quoted an iron of 1.80 to 2.50 sil. with phos. at 1.50 to 2 per cent at 92s. 6d., c.i.f., or about \$21 per ton, duty paid.

An importer who has been negotiating with a German seller on a tonnage of high silicon, low phosphorus hematite iron is offering this quality at \$24.75 per ton, c.i.f. Atlantic port. This iron is on yards, situated for immediate shipment.

#### China an American Market for Machinery

There has been an astonishing increase in the value of machinery absorbed by China, according to the Chinese Maritime Customs returns, says W. H. Rastall,

of the Department of Commerce. The volume in 1922 was the greatest ever taken. In both 1921 and 1922 China imported about fifteen times as much machinery as in 1915. The participation of Japan in this trade is interesting as showing a business of negligible proportions up to about 1915, which has shown a surprisingly consistent increase in volume since that time.

Articles have frequently appeared, says Mr. Rastall, stressing the importance of the German position in this trade, the cleverness of the sales methods adopted by German distributors, the peculiar advantages the machinery trade of Germany enjoyed in China because of the support it received from diplomatic and banking interests and much other comment of a similar nature. Statistics show that Germany occupied an important position in this trade prior to 1914. During the war

the trade was negligible, but immediately following the Armistice it began to pick up and greatly increased, at least through 1922, but even at its best, in spite of the advantage of the depreciating mark and various official efforts to stimulate this business, the trade has not assumed really significant proportions since the war and the latest reports from China indicate that German competition is losing its potency there.

In view of all this, it would appear that the serious competition for the machinery trade of China lies largely between American and British suppliers. In 1921 the share secured by British manufacturers was almost equal to the American percentage, each sending about 40 per cent of the imports, but in 1922 American participation declined seriously to about 23 per cent, while the British expanded to about 44 per cent.

## Japan May Resume Buying by April

Comments on Trade by Luther Becker of Department of Commerce—Europe a Strong Competitor—More Than \$40,000,000 to Be Spent This Year

WASHINGTON, Feb. 5.—Interesting discussion of the export movement of American iron and steel products to Japan is made by Luther Becker, chief of the Iron and Steel Division, Department of Commerce, in Commerce Reports, issued yesterday.

Pointing out that shipments to Japan in 1923 totaled 363,668 tons as against 602,281 tons in 1922, Mr. Becker says that the poor showing last year for American mills was the result of keen competition from the British, Belgians, and Germans, who won a large share of Japan's purchases last year. Great Britain supplied the greater part of the Japanese demand for thin black sheets and much of the tin plate used in the petroleum and fishing industries. Belgium and Germany participated largely in the heavier items of steel, such as bars, shapes and wire rods. Canada was a factor in the wire rod taking of 1923.

Mr. Becker presents the following table which shows in detail America's contribution to Japan's demand for iron and steel in the closing two months of 1923, as well as for the complete year:

Exports of Iron and Steel from the United States to Japan in 1923

(In Gross Tons)		Nov.	Dec.	1923
Articles				
Pig iron				87
Scrap	6	559		8,670
Ingots, blooms, billets, sheets bars and skelp				844
Iron and steel bars	2,323		797	7,177
Alloy steel bars	8		2	66
Wire rods	7,214		5,328	26,070
Plates	168		174	1,307
Galvanized sheets	1,008		3,533	8,848
Black steel sheets	13,770		33,348	74,758
Black iron sheets	46		50	469
Hoops, bands and strip steel	15		45	955
Tinplate, terneplate, etc.	3,142		8,217	37,933
Structural shapes, plain material	1,408		1,130	6,752
Structural materials, fabricated	3,393		1,066	12,715
Metal lath	54		36	124
Steel rails	10,684		12,097	91,718
Rails fastenings, switches, frogs, etc.	1,196		1,464	8,476
Boiler tubes and welded pipe	1,735		2,452	29,099
Cast iron pipe and fittings	11		8	265
Malleable iron pipe fittings	53		24	452
Plain wire	2,408		3,171	23,825
Barbed wire and woven wire fencing	110			268
Other wire and manufactures thereof	83		44	850
Wire nails	5,183		4,712	19,449
Other nails, including tacks	15		77	282
Bolts, nuts, rivets and washers, except track	11		77	642
Car wheels and axles	183		81	1,230
Iron castings	37		47	196
Steel castings	4		12	24
Forgings	13		37	117
Total	54,281		78,588	363,668

Takings of structural shapes, plain and fabricated, did not run so heavily as in former years, which, Mr.

Becker says, is accounted for by the fact that the larger cities, Tokio, Osaka, Yokohama, and Kobe, by the end of 1922 had completed their building programs and up to the time of the earthquake, September, 1923, sufficient office space and hotel accommodations had been provided.

### Imperial Steel Works Factor in Rail Supply

Mr. Becker continues in part as follows:

The figures reveal that the year 1923 was not quite normal with respect to Japan's purchase of steel rails. American rails, both heavy and light, comprising 65, 75 and 100-lb. rails for the Imperial Government Railways, and 60-lb. sections down to 8-lb. for privately owned and industrial railroads, have been in demand now for a number of years and our share in this trade usually runs well over 100,000 tons a year. In addition to this, the Imperial Government Steel Works at Yawata supplies each year a fairly large tonnage of rails to the home market, particularly to the Government-owned lines. Sales of steel rails to the Imperial Government Railways are negotiated through Japanese, American, and British firms who are on the approved list of bidders. Tenders invited from this list provide for the rail specification which includes a few of the standard and well-known foreign brands, or equivalent in quality, and heavy penalties are exacted from the importer who fails to live up to this contract.

The Japanese market demands a thinner black steel sheet than any other in the world, a most difficult specification for a sheet mill to roll. A normal year's supply for Japan of sheets may run as large as 150,000 tons. The United States and Great Britain combined shipped to Japan in 1923 a total of 248,000 tons of black sheets, the major portion of which represented this specification. Sheet mill rollers in this country very reluctantly undertake the job of rolling these thin sheets, particularly in the summer months, when the intense heat of the furnace and the hard work of separating eight sheets, as rolled in the final pass in many sheet mills here, combine to make the task of the men a most trying one.

### British Tin Plate Regaining Pre-War Position

Japan consumes in the neighborhood of 100,000 tons of tin plate each year, and the specifications against which purchases are made are many and exacting. By far the greatest volume is used in the petroleum industry which allocates its purchases among the leading Japanese import houses with branches at New York and London. The remainder is consumed in the canning industry centered at Hakodate where crab and salmon are brought in small steamers from Kamchatka,

used in the making of toys, food and tobacco containers. Purchases for these miscellaneous uses are made through the Japanese as well as American and British firms established in Japan. The British tin plate mills supplied the Japanese market in 1923 with 37,648 tons or only a couple hundred tons less than our own contribution during the same period. The figures would indicate that Great Britain is gradually regaining its position of first rank in the tin plate trade of Japan, which it had enjoyed for many years until the war.

In welded gas and water pipe Japan presents a rich field for American manufacturers. Certain American brands are by-words among the Japanese who call for them on every occasion. The Japanese importer and dealer appreciating the popularity of the American article carries large stocks in central localities from where they are distributed to all parts of the Empire. The Japanese specification for black and galvanized pipe calls for English standard weights, English threads and couplings, and in random lengths of 16 to 18 feet. As a comparison with the foregoing summary, British official statistics show shipments of wrought pipes and fittings to Japan in December, 1923, of 75 tons, and for the full year, 2,779 tons.

#### Japan Developing Wire Rope Manufacture

Japan offers a good opportunity for the sale of an American steel product—wire rods—which are imported for the further manufacture or drawing down in local factories into plain wire which is used as such or for the making of wire nails and wire rope. The Japanese have made rapid strides in the manufacture of wire rope, turning out an article which is very creditable and which finds a ready market in the near-lying countries. A common Japanese specification calls for open-hearth steel wire rods, No. 5 B.W. gage, carbon content 0.06/.12 per cent, in catchweight bundles, unwrapped. In spite of the purchase of large quantities of wire rods Japan still takes a large tonnage each year of plain wire, the receipts from the United States amounting to 23,825 tons in 1923, as against 26,070 tons of wire rods. The demand for plain wire comprises such descriptions as galvanized telegraph and telephone wire which is largely purchased for the Imperial Japanese Government, and for which there are definite specifications to cover; piano wire; umbrella and spring wire; flat wire for clock springs; nail wire; and bright and galvanized wire.

American wire nails are preferred in Japan, as elsewhere in the world's markets, because of the quality of the steel which is used in their manufacture, and the method adopted for packing for export. It would be futile to attempt to outline here any one wire nail assortment typical of the local demand for the reason that sectional requirements are so different. The common Tokio-Yokohama assortment differs from the

Osaka specification, and in each field there are a multitude of these depending on number of kegs of each length and diameter of nail. However, the nail used throughout Japan is the counter-sunk checkered-head, packed in picul kegs of 133½ pounds net each. Nails in packages are not often called for. The table shows large tonnages of this commodity shipped in November and December of last year, representing requirements for the temporary wooden buildings of which 1800 are being constructed in a single day. It has been reported that German nail factories obtained a good sized proportion of Japan's orders for this product for temporary construction.

As stated, the year's total shipments to Japan of plain structural material (6,752 tons) and fabricated shapes (12,715 tons) were not as large as formerly because of the saturation point having apparently been reached in building construction; but the catastrophe which visited the Tokio-Yokohama section has changed all this. The permanent reconstruction program is expected to get under way with the advent of the next fiscal year, April 1, 1924, when active buying of both classes of materials will be resumed on a large scale.

#### More Than \$40,000,000 to Be Spent This Year

The Japanese Diet authorized the expenditure of 87,607,000 yen in this period for restoration of public works both in Tokio and Yokohama and in surrounding prefectures, as well as for fire-prevention zones. The total amount to be expended for reconstruction work during the next five fiscal years is 468,438,849 yen, which sum the Central Government is authorized to borrow. The Central Government was also given authority to guarantee principal and interest of restoration loans floated by the cities of Tokio and Yokohama to the extent of 140,000,000 yen "in case such loans were floated in the foreign market."

Reconstruction will not be hurried, but will be conducted in a systematic and efficient manner to insure the best that the Japanese can possibly obtain in the way of modern cities having wide streets, good roads, parks, canals, water works, sewage system, transportation facilities, warehouses, office and municipal buildings, hotels, etc. Japan should offer an attractive trading market for foreign manufacturers of steel materials during the next 15 or 20 years.

American manufacturers are strongly entrenched in the minds of the Japanese commercial and consuming public because of the good will established during the war, when their products for the first time gained wide recognition and approval. American-made modern steel and ferro-concrete buildings proved their worth when they came through the 1923 catastrophe without serious damage, and to the Japanese people they will stand as monuments to the fame of American engineering practice and quality.

#### Canadian Scrap Market

TORONTO, ONT., Feb. 4.—While the demand for iron and steel scrap is picking up gradually the improvement is still below the expectations of dealers. Melters are buying in a conservative manner, but orders for small tonnages are appearing more frequently than in the past. No buying into second quarter has been reported. Operations among steel plants in Ontario has improved considerably during the past two or three weeks, chiefly as the result of orders placed by the Canadian Pacific and Canadian National Railways for rails. During the past week the Canadian Pacific Railway recently placed a contract with the Algoma Steel Corporation, Sault Ste. Marie, Ont., for 50,000 tons of rails for its Western lines, which in addition to contracts awarded by the Canadian National Railway will keep this rail mill busy for some time. The steel plant at Hamilton, Ont., is operating around 70 per cent capacity. Scrap requirements from these concerns have had a stimulating effect on recent business. Foundries are extending their operations. Heavy melting steel and turnings are moving steadily and improve-

ment is also reported in No. 1 machinery cast. Prices are firm. Dealers' buying prices are as follows:

	Gross Tons	
	Toronto	Montreal
Steel turnings .....	\$10.00	\$7.00
Machine shop turnings.....	10.00	7.00
Wrought pipe .....	8.00	7.00
Rails .....	12.00	12.00
No. 1 wrought scrap.....	12.00	13.00
Heavy melting steel.....	12.00	11.50
Steel axles .....	15.00	18.00
Axles, wrought iron.....	18.00	20.00
	Net Tons	
Standard car wheels.....	15.00	14.00
Malleable scrap .....	15.00	15.50
Stove plate .....	15.00	14.00
No. 1 machinery cast.....	18.00	21.00

The Maryland Steel Rolling Co., 1410 Fidelity Building, Baltimore, has plans for the expansion of its cold strip rolling business. The company will combine the Trenton Strip Steel Co., Trenton, N. J., which it bought some time ago, with a going plant in southern Pennsylvania and one in Maryland yet to be built. As these plans have not been fully worked out, the Maryland Steel Rolling Co. reserves detailed announcement.

## MORE ACTIVE STACKS

### Increase of 11 Furnaces in Blast in Pittsburgh and Nearby Districts

PITTSBURGH, Feb. 5.—There are 11 more blast furnaces in production in this and nearby districts today than at the end of December. The Carnegie Steel Co. has added five stacks to its active list, now having 48 out of 59 furnaces in blast. The Jones & Laughlin Steel Corporation and Pittsburgh Crucible Steel Co., each has added one furnace. In the Pittsburgh district proper, there are now only 8 idle furnaces. In the Mahoning and Shenango Valleys, Youngstown Sheet & Tube Co. has put on 2 furnaces and is preparing to put on a third; the Carnegie Steel Co. has put on a furnace at Newcastle and the M. A. Hanna Co. has put on its Dover, Ohio, stack. Bethlehem Steel Co. has put on 2 furnaces at Johnstown. The stack of the Sharpsville Furnace Co., Sharpsville, Pa., has been blown out since Jan. 1. The record of active and idle furnaces as of today compares with that at the end of December as follows:

Pittsburgh District Steel Works Furnaces					
	Total	Feb. 5, 1924		Dec. 31, 1923	
		In	Out	In	Out
American Steel & Wire Co.					
Ponora	2	1	1	1	1
Schoenberger	2	2	0	2	0
Carnegie Steel Co.					
Carrie	7	7	0	7	0
Clairton	3	3	0	3	0
Duquesne	6	5	1	5	1
Edgar Thomson	11	10	1	9	2
Edith	1	0	1	0	1
Isabella	3	3	0	2	1
Lucy	2	2	0	0	2
Neville	1	1	0	1	0
Pittsburgh Crucible Steel Co.	2	2	0	1	1
Jones & Laughlin Steel Corporation					
Aliquippa	5	5	0	5	0
Eliza	6	5	1	4	2
Soho	1	0	1	0	1
National Tube Co.	4	4	0	4	0
Pittsburgh Steel Co.	2	1	1	1	1
Merchant Furnaces					
Clinton Iron & Steel Co.	1	0	1	0	1
Total	59	51	8	45	14

### Mahoning & Shenango Valley Districts Steel Works Furnaces

	Total	Feb. 5, 1924		Dec. 31, 1923	
		In	Out	In	Out
Carnegie Steel Co.					
Farrell	3	3	0	3	0
New Castle	4	3	1	2	2
Niles	1	0	1	0	1
Ohio	6	6	0	6	0
Sharon	1	0	1	0	1
Republic Iron & Steel Co.	7	4	3	4	3
Sharon Steel Hoop Co.	1	1	0	1	0
Trumbull Cliffs Furnace Co.	1	1	0	1	0
Youngstown Sheet & Tube Co.	9	7	2	5	4
Merchant Furnaces					
A. M. Byers Co.	1	1	0	1	0
Hanna Furnace Co.					
West Middlesex	1	0	1	0	1
Leetonia, Ohio	1	1	0	1	0
Dover, Ohio	1	1	0	0	1
Reliance Coke & Furnace Co.					
West Middlesex, Pa.	1	0	1	0	1
Sharpsville, Pa.	1	0	1	0	1
McKee Iron Co.	1	0	1	0	1
Sharpsville Furnace Co.	1	0	1	1	0
Shenango Furnace Co.	2	1	1	1	1
Struthers Furnace Co.	1	1	0	1	0
Stewart Furnace Co.	1	1	0	1	0
Valley Mold & Iron Corp.	1	0	1	0	1
Total	46	31	15	28	18
Western Pennsylvania Steel Works Furnaces					
Bethlehem Steel Co., Johnstown, Pa.	11	6	5	4	7
Merchant Furnaces					
Adrian Furnace Co., Dubois, Pa.	1	1	0	1	0
American Manganese Mfg. Co.	2	0	2	0	2
Kittanning Iron & Steel Mfg. Co.	1	0	1	0	1
McKinney Steel Co.					
Scottdale, Pa.	1	1	0	1	0
Josephine, Pa.	2	2	0	2	0
Perry Furnace Co.	1	0	1	0	1
Punxsutawney Furnace Co.	1	1	0	1	0
Total	20	11	9	9	11
Wheeling District Steel Works Furnaces					
Carnegie Steel Co.					
Bellaire, Ohio	2	2	0	2	0
Mingo, Ohio	4	3	1	3	1
Steubenville, Ohio	1	0	1	0	1
National Tube Co.	2	2	0	2	0
Wheeling Steel Corp.	5	2	3	2	3
Weirton Steel Co.	1	1	0	1	0
Total	15	10	5	10	5
Grand Total	140	103	37	92	48

\*One furnace dismantled since a month ago.

### Weirton Steel Co.'s New Records

PITTSBURGH, Feb. 5.—The Weirton Steel Co., Weirton, W. Va., in January had the largest operations in its history. For the second time in the past three months ingot production exceeded 50,000 tons. In addition the company established new records in total production of all finishing mills; in total shipments; in production of hot-and-cold-rolled strip steel and of billets, slabs and sheet bars, all the company's mills are scheduled full for this month.

### Association of Oil Burner Trade

A new association for manufacturers of oil burning equipment or equipment used in oil burning installations and for oil companies is now being organized. Officers and a board of directors already exist and the first annual meeting will be held at the Hotel Chase, St. Louis, on April 1, 2 and 3. The headquarters of the association are at 518 Bank of Galesburg Building, Galesburg, Ill.

The officers and directors of the organization, which is known as the American Association of Oil Burner Manufacturers, are as follows:

President, Wallace C. Capen, Home Appliance Corporation, St. Louis.

Vice-presidents: Ernest H. Peabody, Peabody Engineering Corporation, New York; L. P. Ordway, Jr., Winslow Boiler & Engineering Co., Chicago; A. M. Lockett, A. M. Lockett Co., Ltd., New Orleans; J. T. Voorheis, Coen Co., San Francisco; Lionel L. Jacobs, Fess Oil Burners of Canada, Toronto, Ont.

Directors: Edward P. Bailey, National Airol Burner Co., Philadelphia; John Scheminger, Jr., Aetna Auto-

matic Oil-Burner, Inc., Providence, R. I.; C. E. Bird, Bird Oil Burner Corporation, Minneapolis; W. R. Ray, W. S. Ray Mfg. Co., San Francisco, Cal.; B. M. Oliver, Oliver Oil-Gas Burner Co., St. Louis, Mo.

Secretary, Leod D. Becker, 518 Bank of Galesburg Bldg., Galesburg, Ill.

### Chicago Association Formed

At a dinner and meeting held at the Hotel Virginia, Chicago, Jan. 15, a Chicago Oil Burning Association was formed, and the following officers elected: President, E. W. Sladkey, Winslow Boiler & Engineering Co.; vice-president, E. A. Weil, Automatic Burner Corporation; directors: Charles E. Gauer, vice-president Sterling Refining Co.; Robert R. Schurig, secretary, Chicago Steel Tank Co.; B. G. Kauffman, manager Chicago branch, W. S. Ray Mfg. Co.; C. B. Fletcher, general manager Cities Service Oil Co.; J. Castino, Gill Mfg. Co., and Joseph F. Gillen, Automatic Heat Machine Co.

### Committees Appointed

The following committees have been appointed: Committee for cooperation with Underwriters Laboratories in revising standards: Chairman, J. H. Hirsch, Automatic Burner Corporation, Chicago; committee on simplification and nomenclature, to cooperate with the division of simplification, Department of Commerce, toward standardization of burner parts, and for working out a standard nomenclature for oils and burners: Chairman, Arthur E. Shaw, Pennsylvania Globe Rotary Oil Burner Co., Philadelphia.

Notices of a 10 per cent reduction in wages in all departments of the Butler, Pa., plant of the Standard Steel Car Co. were posted Feb. 1.

## IRON AND STEEL JOBBERS' SALES

## Two-Years' Record and a Comparison with Accounts Outstanding

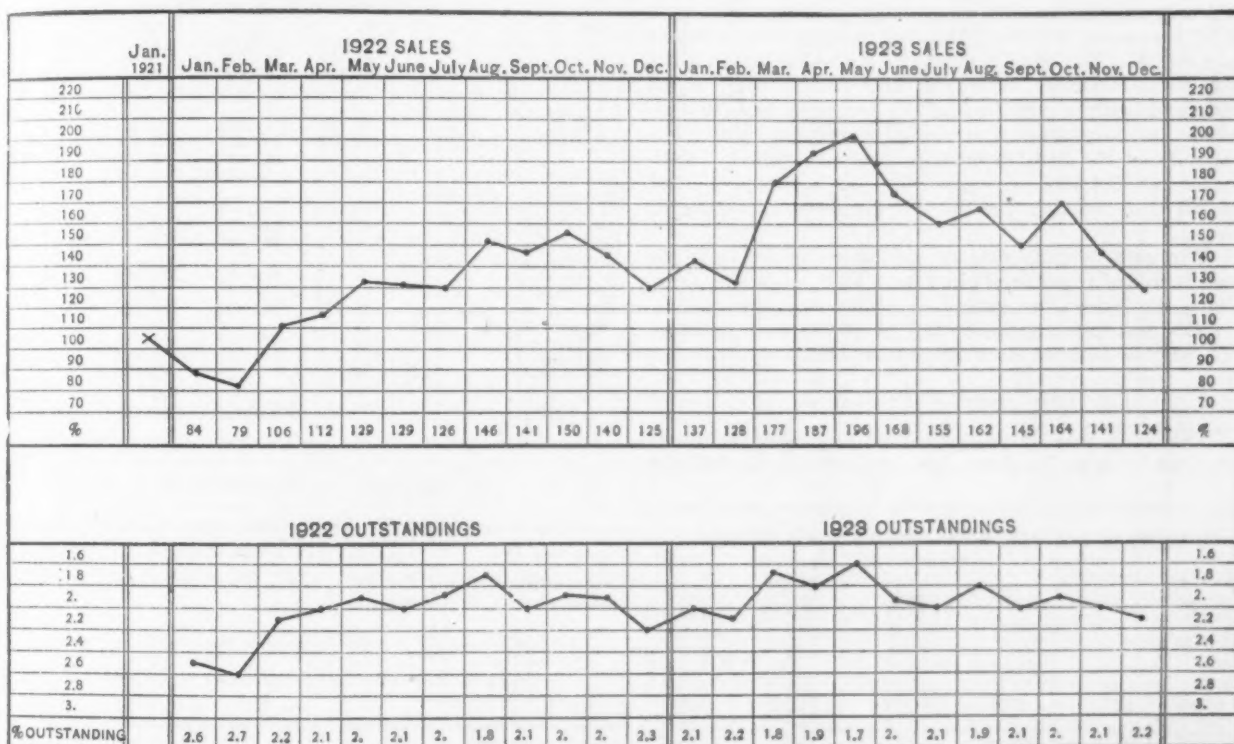
The American Iron, Steel and Heavy Hardware Association received monthly reports from its members during 1922 and 1923 covering volume of sales and of outstanding accounts. When the first statistics were gathered early in 1922, sales for January, 1921, were reported also, and these have been taken as the basing point in the charting of statistics for the past two years. In the charts below percentages are used. In 1922 the low point was February, with sales 79 per cent of those for January, 1921. The high point in 1922 was

of fluids handled in pipes. Hence, it will be necessary to use not only the several colors selected as general designations, but also specific markings on those colors to indicate the particular fluid within the group of designation.

All of this study is being carried on in three sub-committees, each devoted to a specific topic. Final report is expected to be made some time before the middle of the year.

## Replogle Steel Co. Report

The statement of the Replogle Steel Co., the Wharton & Northern Railroad and the Ferro Monte Railroad for the quarter ended Dec. 31 last showed a net loss of \$235,747 after depreciation and maintenance. This



Graphs Indicating Volume of Sales of Members of American Iron, Steel and Heavy Hardware Association, Also a Comparison of Outstanding Accounts. In the upper chart sales for January, 1921, are taken as the base

October, with 150 per cent. In 1923 the low point in the early part of the year was February, with sales of 128 per cent. Then followed a rapid increase until the end of May, when 196 per cent was reached. From May to the end of 1923, with the exception of two slight rebounds, the trend was downward. The expectation is that January reports will cause the curve to turn upward.

The lower graph shows the monthly average amount of accounts outstanding as compared with the month's sales. It appears from this curve that when sales are good collections are good, and as business falls off outstanding accounts are harder to collect. In February, 1922, with the poor showing in sales, amounts outstanding on members' books were nearly three times the total of monthly sales, but at the peak in May the outstandings were only 1.8 times sales.

## Identification of Piping Systems

Under the auspices of the American Society of Mechanical Engineers, the American Engineering Standards Committee has been studying the use of colors on piping, with the idea of proposing an American standard code. The study has involved the question of durability of colors under atmospheres containing acids, alkalis, heat, water vapor, etc., and has gone into questions of cost of pigments. About 200 different combinations will be required because of the large number

compared with a deficit of \$79,789 the preceding quarter and \$18,741 for the quarter ended June 30, 1923. The net loss for the full year amounted to \$427,811.

## Toledo Furnace to Be Rebuilt

The Toledo Furnace Co., Toledo, Ohio, is planning to dismantle its present B furnace and will replace it with a considerably larger stack. Contracts for work will be placed shortly. However, the present stack may be kept in blast for some time.

The Samuel W. Black Co., Pittsburgh, recently disposed of the property of the Allegheny Forging Co., McDonald, Pa., to Raphael Zaverella, who took title for the General Foundry & Machine Co. The property consists of about two and one-half acres, improved with a number of modern manufacturing buildings. The machinery, power plant and fixtures were included in the deal.

Rigid airships are to be discussed at a meeting of the Metropolitan section of the American Society of Mechanical Engineers at the Engineering Societies Building, New York, on the evening of Feb. 11. The papers will deal principally with the design and construction of the airship Shenandoah.

## JANUARY IRON OUTPUT

### Increase Over December 3159 Tons Per Day, Largely Steel-Making Grades

#### Eighteen Furnaces Blown In and Only One Blown Out—First Gain Since May

PRODUCTION of coke and anthracite pig iron for the 31 days of January amounted to 3,018,890 tons, or 97,384 tons per day, as compared with 2,920,982 tons or 94,225 tons per day for the 31 days of December. This is a gain of 97,908 tons or 3159 tons per day over the December production. There were 18 furnaces blown in and only one blown out in January, making a net gain of 17 furnaces. Of these 18, steel making iron furnaces number 16. This gain compares with neither a gain nor a loss in December, when the 1923 decline came to an end, and with a net loss of 14 furnaces and 10 furnaces in November and October respectively. The capacity of the 248 furnaces in blast on Feb. 1 is estimated at 101,435 tons per day, as contrasted with 94,265 tons per day for the 231 furnaces operating on Jan. 1.

The gain in daily rate of production in January, the first increase registered since last May, puts the figure above the November output of 96,476 tons per day.

The ferromanganese output of 20,735 tons in January was the largest since September, 1923.

#### Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from January, 1923, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons			
	Steel Works	Merchant	Total
January, 1923.....	79,991	24,190	104,181
February.....	80,684	26,251	106,935
March.....	87,881	25,792	113,673
April.....	90,145	28,179	118,324
May.....	96,029	28,735	124,764
June.....	90,907	31,641	122,548
July.....	88,798	29,858	118,656
August.....	86,479	24,795	111,274
September.....	78,799	25,385	104,184
October.....	77,255	24,331	101,586
November.....	72,352	24,124	96,476
December.....	69,921	24,304	94,225
January, 1924.....	73,368	24,016	97,384

The figures for daily average production, beginning with January, 1918, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1918—Gross Tons										
	1918	1919	1920	1921	1922	1923	1924			
Jan.	77,799	106,525	97,264	77,945	53,063	104,181	97,384			
Feb.	82,835	105,006	102,720	69,187	58,214	106,935				
Mar.	103,648	99,685	108,900	51,468	65,675	113,673				
Apr.	109,607	82,607	91,327	39,768	69,070	118,324				
May	111,175	68,002	96,312	39,394	74,409	124,764				
June	110,793	70,495	101,451	35,494	78,701	122,280				
July	110,354	78,340	98,931	27,889	77,592	118,656				
Aug.	109,341	88,496	101,529	30,780	58,586	111,274				
Sept.	113,942	82,932	104,310	32,850	67,791	104,184				
Oct.	112,462	60,115	106,212	40,215	85,092	101,586				
Nov.	111,802	79,745	97,830	47,183	94,990	96,476				
Dec.	110,762	84,944	87,222	53,196	99,577	94,225				
Year	105,496	83,789	99,492	45,325	73,645	109,713				

Among the furnaces blown in during January were the following: The Brooke furnace in the Schuylkill Valley; Edgar Thomson D furnace, No. 3 Isabella and No. 2 Lucy of the Carnegie Steel Co. and No. 2 Midland furnace of the Pittsburgh Crucible Steel Co. in the Pittsburgh district; No. 1 Newcastle furnace of the Carnegie Steel Co. in the Shenango Valley; two Johnstown furnaces at the Cambria plant of the Bethlehem Steel Corporation in western Pennsylvania; the Top Mill furnace of the Wheeling Steel & Iron Corporation in the Wheeling district; No. 2 Haseltan furnace of the Republic Iron & Steel Co. and No. 2 Hubbard of the Youngstown Sheet & Tube Co. in the Mahoning Valley;

the Dover and one Otis furnace in northern Ohio; No. 1 Joliet and Nos. 2 and 8 South Chicago furnaces of the Illinois Steel Co. in the Chicago district; No. 2 Bessemer furnace of the Tennessee Coal, Iron & Railroad Co. and No. 3 Woodward furnace of the Woodward Iron Co. in Alabama.

Only one furnace was blown out during January, the Sharpville furnace in the Shenango Valley.

#### Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces for January and the three months preceding:

Pig Iron Production by Districts, Gross Tons				
	Jan. (31 days)	Dec. (31 days)	Nov. (30 days)	Oct. (31 days)
New York.....	211,572	204,157	193,621	219,857
New Jersey.....	18,038	19,272	18,509	19,473
Lehigh Valley.....	91,863	83,332	82,748	81,614
Schuylkill Valley..	67,757	71,838	73,069	91,457
Lower Susquehanna and Lebanon Val- leys.....	63,789	64,002	63,720	60,568
Pittsburgh district..	609,500	595,317	595,876	653,370
Shenango Valley..	106,316	97,527	99,228	117,656
Western Pa.....	124,503	109,419	116,910	157,649
Maryland, Virginia and Kentucky....	60,235	61,470	68,787	60,278
Wheeling district..	145,214	140,659	136,349	141,593
Mahoning Valley..	326,629	293,043	280,667	279,834
Central and North- ern Ohio.....	265,471	266,128	265,198	282,009
Southern Ohio.....	43,902	44,708	24,619	36,083
Illinois and Indiana	525,975	522,994	535,362	595,457
Mich., * Minn., Mo., Wis. and Colo....	126,879	124,993	111,291	117,128
Alabama.....	225,556	214,013	215,613	213,105
Tennessee.....	5,691	8,110	12,676	21,427
Total.....	3,018,890	2,920,982	2,894,295	3,149,158

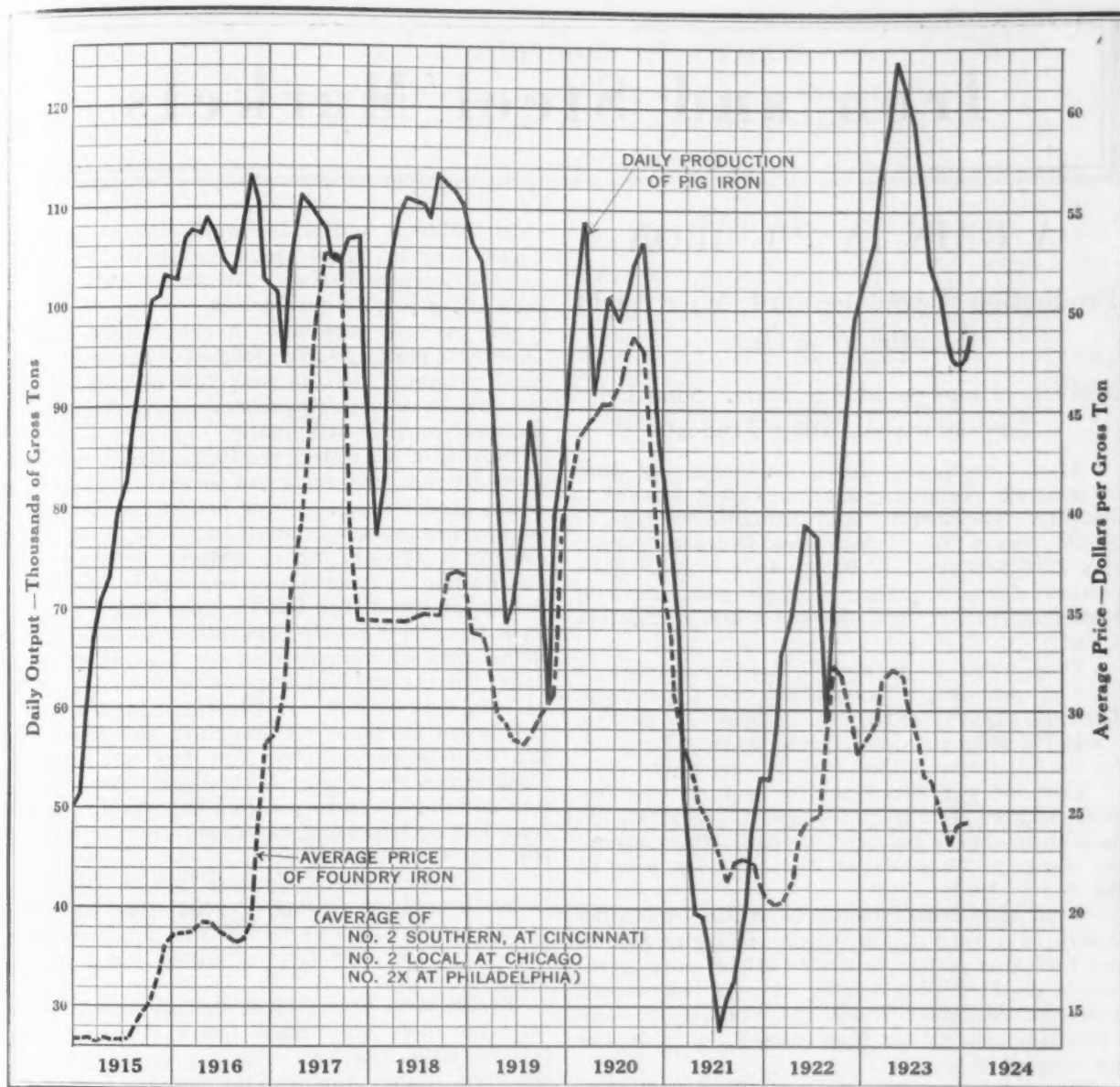
#### Capacities in Blast Feb. 1

The following table shows the number of furnaces in blast Feb. 1 in the different districts and their capacity, also the number and daily capacity in gross tons of furnaces in blast Jan. 1:

Coke and Anthracite Furnaces in Blast					
Location of Furnaces	Total Stacks	Feb. 1		Jan. 1	
		In Blast	Capacity per Day	In Blast	Capacity per Day
<i>New York:</i>					
Buffalo .....	22	16	6,390	16	6,540
Other New York ....	5	2	430	2	400
New Jersey .....	4	2	580	2	610
<i>Pennsylvania:</i>					
Lehigh Valley .....	16	7	2,710	7	2,900
Spiegeleisen .....	2	2	255	2	245
Schuylkill Valley....	15	7	2,270	6	2,055
Lower Susquehanna..	9	5	1,525	6	1,550
Ferromanganese ..	1	1	70	0	...
Lebanon Valley...	4	2	390	2	375
Ferromanganese ..	2	1	70	1	75
Pittsburgh District..	55	45	20,250	41	18,740
Ferro and Spiegel..	4	4	330	4	435
Shenango Valley....	17	8	3,540	8	3,170
Western Pa. ....	24	13	4,200	11	3,480
Ferro and Spiegel..	2	0	...	0	...
Maryland .....	5	3	1,480	3	1,410
Ferromanganese ..	1	1	100	1	85
Wheeling District...	15	11	4,840	10	4,530
<i>Ohio:</i>					
Mahoning Valley....	28	22	10,955	20	9,475
Central and Northern	26	18	9,000	16	8,380
Southern .....	14	5	1,415	5	1,430
Illinois and Ind. ....	42	34	18,000	31	16,885
Mich., Wis. and Minn..	12	8	3,275	8	3,290
Colorado and Missouri.	6	2	850	2	825
<i>The South:</i>					
Virginia .....	18	3	360	3	400
Kentucky .....	7	1	310	1	300
Alabama .....	39	24	7,650	22	6,500
Ferromanganese ..	1	0	...	0	...
Tenn., Ga. and Texas..	16	1	190	1	180
Total .....	412	248	101,435	231	94,265

#### Production of Steel Companies—Gross Tons

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies, as well as from merchant furnaces producing ferromanganese and spiegelstein, show the foregoing totals of steel making iron, month by month, together



with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

dry iron at furnaces in Chicago, and No. 2X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.

Production of Steel Companies—Gross Tons		Spiegeleisen and Ferromanganese	
(Total Production)		1923	1924
1923	1924	Fe-Mn Spiegel	Fe-Mn Spiegel
Jan. ... 2,479,727	2,274,005	19,358	12,056
Feb. ... 2,259,154	...	21,282	3,657
Mar. ... 2,724,305	...	20,730	13,832
Apr. ... 2,704,360	...	20,808	7,440
May ... 2,976,892	...	19,568	9,533
June ... 2,727,208	...	19,717	18,289
6 mos. ... 15,871,646	...	121,564	64,807
July ... 2,752,738	...	26,493	12,876
Aug. ... 2,680,851	...	22,045	5,586
Sept. ... 2,363,967	...	23,206	4,478
Oct. ... 2,394,922	...	20,015	15,931
Nov. ... 2,170,567	...	14,839	16,783
Dec. ... 2,167,563	...	18,069	10,124
Year ... 30,402,254	...	246,231	130,585

#### Production and Price Chart

The fluctuations in pig iron production from 1915 to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of the daily average production, by months, of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2 foundry pig iron at Cincinnati, local No. 2 foundry

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1920—Gross Tons		1920	1921	1922	1923	1924
Jan. ...	3,015,181	2,416,292	1,644,951	3,229,604	3,018,890	
Feb. ...	2,978,879	1,937,257	1,629,991	2,994,187		
Mar. ...	3,375,907	1,595,522	2,035,920	3,523,868		
Apr. ...	2,739,797	1,193,041	2,072,114	3,549,736		
May ...	2,985,682	1,221,221	2,306,679	3,867,694		
June ...	3,043,540	1,064,833	2,361,028	3,676,445		
½ year ...	18,138,986	9,428,166	12,050,683	20,841,534		
July ...	3,067,043	864,555	2,405,365	3,678,334		
Aug. ...	3,147,402	954,193	1,816,170	3,449,493		
Sept. ...	3,129,323	985,529	2,033,720	3,125,512		
Oct. ...	3,292,597	1,246,676	2,637,844	3,149,158		
Nov. ...	2,934,908	1,415,481	2,849,703	2,894,295		
Dec. ...	2,703,855	1,649,086	3,086,895	2,920,982		
Year* ...	36,414,114	16,543,686	26,880,393	40,059,308		

\*These totals do not include charcoal pig iron. The 1922 production of this iron was 224,731 tons.

Union furnace, in the Hanging Rock district of Ohio, has been dismantled. It had not been in operation for many months.

One Aliquippa furnace of the Jones & Laughlin Steel Corporation, Pittsburgh, is producing ferromanganese.

# Iron and Steel Markets

## A GAIN IN PIG IRON

### Production Turns Upward After Eight Months of Decline

#### Mill Operations on a Large Scale—Some Price Concessions on Minor Products

After a continuous decline beginning with June of last year pig iron production turned upward in January. The month's total was 3,018,890 tons, or 97,384 tons a day, whereas the December output was 2,920,982 tons, or 94,225 tons a day. Steel company furnaces furnished all the gain, merchant furnace output, in fact, showing a loss of 288 tons a day.

There was a net gain of 17 in active furnaces, 8 Steel Corporation, 8 independent and 1 merchant. The daily capacity of the 248 furnaces in blast Feb. 1 was 101,435 tons a day against 94,265 tons a day for the 231 furnaces that were producing on Jan. 1.

Thus the pig iron statistics confirm what has been reported from week to week of a moderate expansion in orders for finished steel, after consumers' stocks had been drawn down to a low point at the end of 1923.

Some large independent steel companies started in February with an increase in mill schedules, in two instances getting up to the 90 per cent operation of the Steel Corporation. Several independent producers put a considerably larger tonnage on their books last month than they shipped, but this was not true of all.

In general the price level in finished steel commonly recognized since May of last year is still maintained, but in the absence of such forward buying as accompanies a rising market reports of concessions crop up here and there.

A Northern Ohio mill bought 5000 tons of sheet bars from a steel plant in another State at a price equal to \$41, Youngstown, but mills there are holding to \$42.50.

In steel bars some mills recently went below the 2.40c., Pittsburgh price, to get the backlog orders to which they have since been adding. Eastern prices for plates have dipped \$2 to \$3 a ton below the 2.50c. Pittsburgh basis.

Pittsburgh reports that in the past week there have been sales of cold-rolled strip steel at 4.75c., of light rails at 2c., base, and of heavy rivets at several dollars a ton below recent prices. On the main tonnage products, however, the situation is generally strong.

Propaganda appears in some recent statements about railroad equipment orders, car builders denying reports of secret purchases of large numbers of steel cars. Track requirements continue of good size. The Pennsylvania Railroad has bought 2400 tons of tie plates and the Nickel Plate is inquiring for 3500 tons.

The New York Central has bought 80 locomotives. The Norfolk & Western is taking bids on 45,000 tons of plates, shapes and bars for car work. Other railroad equipment inquiries represent about 1750 freight cars.

Late bookings and also fresh inquiries for

steel buildings and bridge work amount to about 25,000 tons in sizable jobs, or up to the totals for the week preceding. About one-half, as before, is for private enterprises.

In wrought pipe and in the lighter lines—sheets, tin plate and wire products—the mills have good prospects for the next few months. Some irregularity is seen in jobbers' prices for tubular products and for wire nails.

Buying of pig iron in the Philadelphia and New York districts has amounted to about 50,000 tons and a good tonnage is now pending. The effect is shown in greater firmness in prices in the East, except at Boston, where eastern Pennsylvania and Buffalo irons have been in active competition. Buying at Pittsburgh has included 40,000 tons of basic iron for a Steel Corporation subsidiary and 20,000 tons of foundry iron for a sanitary company, but the \$22 Valley price on basic still prevails in that district. In Cleveland higher prices are named on basic. Although in the South the \$22.50 price on foundry iron has not entirely disappeared, the market is stronger. More attention is being given to possible imports of foreign iron, but no important movement from abroad in the near future is expected.

The offering of the Japanese loan in New York brings nearer the placing of good structural steel orders here for Japan's rebuilding. An immediate inquiry is for 7300 tons of plates for Japanese boats.

Recent large orders given British steel mills by railroads there have made Great Britain's competition with American mills for export business less keen. Lately American tin plate has been gaining ground in Italy, Japan and China on the score of quality. Argentina is inquiring here for 10,000 tons of steel for bridge work.

Stocks of steel in the Ruhr have not greatly disturbed export markets. A good deal has been shipped to French possessions, and prices have not been as low as expected.

## Pittsburgh

### Demand for Steel Products Active—Heavy Buying of Pig Iron

PITTSBURGH, Feb. 5.—It was realized during its course that last month would be a good month in steel business, but in retrospect January with most manufacturers proved a little better than expectations. This has found reflection in a further gain in steel plant activities. The leading local independent starts the new month with 90 per cent of its ingot capacity engaged and operations of independent steel works generally in this and nearby districts are probably above rather than below 85 per cent capacity. The Carnegie Steel Co. still is producing ingots at about 90 per cent of capacity and the past month has brought a net increase of 11 blast furnaces in the Pittsburgh and nearby districts. Eleven steel works furnaces and one merchant stack have resumed, while one merchant furnace was blown out during the month.

While the high rate of steel plant operations is based chiefly on orders, there was some evidence that

## A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics  
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Feb. 5, 1924	Jan. 29, 1924	Jan. 8, 1924	Feb. 6, 1923
No. 2X, Philadelphia...	\$23.63	\$23.63	\$24.26	\$29.76
No. 2, Valley furnace...	23.00	23.00	22.00	27.00
No. 2, Southern, Cin'ty...	26.55	26.55	25.05	28.05
No. 2, Birmingham, Ala. f...	22.50	22.50	21.00	24.00
No. 2 foundry, Chicago*	<b>24.50</b>	24.00	23.50	29.50
Basic, del'd, eastern Pa...	22.50	22.50	23.25	28.00
Basic, Valley furnace...	22.00	22.00	21.00	25.50
Valley Bessemer, del. P'gh.	<b>25.26</b>	24.76	24.76	29.52
Malleable, Chicago*	<b>24.50</b>	24.00	23.50	29.50
Malleable, Valley	<b>23.00</b>	22.50	22.00	27.00
Gray forge, Pittsburgh...	<b>23.73</b>	23.26	23.26	28.27
L. S. charcoal, Chicago...	29.15	29.15	29.15	33.15
Ferromanganese, furnace...	107.50	107.50	109.00	107.50

Rails, Billets, Etc., Per Gross Ton:	Feb. 5, 1924	Jan. 29, 1924	Jan. 8, 1924	Feb. 6, 1923
O.-h. rails, heavy, at mill...	\$43.00	\$43.00	\$43.00	\$43.00
Bess. billets, Pittsburgh...	40.00	40.00	40.00	38.50
O.-h. billets, Pittsburgh...	40.00	40.00	40.00	38.50
O.-h. sheet bars, P'gh...	42.50	42.50	42.50	39.50
Forging billets, base, P'gh.	45.00	45.00	45.00	45.00
O.-h. billets, Phila...	45.17	45.17	45.17	45.17
Wire rods, Pittsburgh...	51.00	51.00	51.00	47.50
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb...	2.35	2.35	2.35	2.10
Light rails at mill...	<i>2.00</i>	2.15	2.25	2.15

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	2.57	2.57	2.62	2.475
Iron bars, Chicago...	2.40	2.40	2.40	2.35
Steel bars, Pittsburgh...	2.40	2.40	2.40	2.15
Steel bars, Chicago...	2.50	2.50	2.50	2.10
Steel bars, New York...	2.74	2.74	2.74	2.44
Tank plates, Pittsburgh...	2.50	2.50	2.50	2.20
Tank plates, Chicago...	2.60	2.60	2.60	2.30
Tank plates, New York...	2.69	2.74	2.74	2.54
Beams, Pittsburgh...	2.50	2.50	2.50	2.15
Beams, Chicago...	2.60	2.60	2.60	2.20
Beams, New York...	2.74	2.74	2.74	2.49
Steel hoops, Pittsburgh...	3.00	3.00	3.00	2.75

\*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

+Silicon, 1.75 to 2.25. †Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Feb. 5, 1924	Jan. 29, 1924	Jan. 8, 1924	Feb. 6, 1923
	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.	3.85	3.85	3.75	3.35
Sheets, galv., No. 28, P'gh.	5.00	5.00	4.90	4.35
Sheets, blue an'd, 9 & 10	3.00	3.00	3.00	2.60
Wire nails, Pittsburgh...	3.00	3.00	3.00	2.70
Plain wire, Pittsburgh...	2.75	2.75	2.75	2.55
Barbed wire, galv., P'gh...	3.80	3.80	3.80	3.35
Tin plate, 100-lb. box, P'gh.	\$5.50	\$5.50	\$5.50	\$4.75

Old Material, Per Gross Ton:	Feb. 5, 1924	Jan. 29, 1924	Jan. 8, 1924	Feb. 6, 1923
Carwheels, Chicago...	\$20.50	\$20.50	\$20.00	\$27.00
Carwheels, Philadelphia...	21.00	21.00	20.00	24.00
Heavy steel scrap, P'gh...	22.00	22.00	20.00	22.50
Heavy steel scrap, Phila...	19.00	19.00	17.50	20.00
Heavy steel scrap, Ch'go...	18.00	18.50	16.75	19.75
No. 1 cast, Pittsburgh...	<b>21.50</b>	21.00	21.00	24.00
No. 1 cast, Philadelphia...	21.00	21.00	20.50	24.00
No. 1 cast, Ch'go (net ton)	<b>21.00</b>	20.50	20.00	23.00
No. 1 RR. wrot. Phila...	22.00	22.00	20.00	24.00
No. 1 RR. wrot. Ch'go (net)	15.00	15.50	15.00	18.00

Coke, Connellsville, Per Net Ton at Oven:	Feb. 5, 1924	Jan. 29, 1924	Jan. 8, 1924	Feb. 6, 1923
Furnace coke, prompt...	\$4.00	\$4.00	\$3.75	\$7.50
Foundry coke, prompt...	4.75	4.75	4.75	8.50

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	12.75	13.00	13.12½	15.12½
Electrolytic copper, refinery	12.37½	12.50	12.62½	14.75
Zinc, St. Louis...	<b>6.65</b>	6.50	6.42½	7.05
Zinc, New York...	<b>7.00</b>	6.85	6.77½	7.40
Lead, St. Louis...	<b>8.40</b>	8.10	7.95	8.10
Lead, New York...	<b>8.65</b>	8.37½	8.25	8.10
Tin (Straits), New York...	<b>51.00</b>	48.25	48.00	40.12½
Antimony (Asiatic), N. Y.	10.50	10.50	10.00	7.12½

### Composite Price, Feb. 5, 1924, Finished Steel, 2.789c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	Jan. 29, 1924, 2.789c. Jan. 8, 1924, 2.775c. Feb. 6, 1923, 2.560c. 10-year pre-war average, 1.689c.
These products constitute 88 per cent of the United States output of finished steel	

### Composite Price, Feb. 5, 1924, Pig Iron, \$22.77 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Jan. 29, 1924, \$22.69 Jan. 8, 1924, 21.96 Feb. 6, 1923, 26.63 10-year pre-war average, 15.72
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a portion of the production is against future requirements. With the labor supply ample and the railroads functioning in remarkable fashion on account of the open winter, there is some building up of stocks against the time when outdoor work will attract common labor away from the steel plants. With the self-contained steel companies, such a course amounts to merely the stocking of labor. The fact that the secondary market still shows some irregularity and weakness, with sales by jobbers of pipe and wire products at practically the mill bases, rather suggests that the consumptive demand still is below the current rate of production and shipments. Steel prices generally are holding well, the only important exceptions being cold-rolled strip steel in which there have been a good many sales recently at 4.75c. base as against the regular quotation

of 5c., and in light rails, which have been quoted as low as 2c. base, or \$5 a ton below the price the mills tried to maintain. The market also is very weak on rivets, with sales of heavy ones noted as low as \$2.60 base, or \$6 a ton below the regular quotation. There is overproduction of rivets and competition for business is so keen that prices at the moment lean very much in buyers' favor.

In point of sales the past week has been the most active one in the pig iron market since last November, and by contrast with the November activity all of the recent demand has been from consumers. We estimate the week's sales at between 75,000 and 80,000 tons, of which about 60,000 tons was taken by two consumers, the National Tube Co. having closed on 40,000 tons of basic iron and the Standard Sanitary Mfg. Co. on 20,-

000 tons of foundry iron. While these sales have not resulted in higher prices, it is believed they have reduced the available supplies materially and that this will enable producers to advance their prices. The lull in trading scrap iron and steel continues and prices show no material change from those of a week ago.

Acceptance of second quarter business in furnace coke by Connellsville producers at \$4.25 a net ton at ovens indicates that the blast furnace interests still have the upper hand in that market.

**Pig Iron.**—In spite of the big sales of the past week, the market has been somewhat of a disappointment to sellers viewed from the price standpoint. The National Tube Co. was not obliged to pay more than \$22, Valley furnace, or its equivalent for 40,000 tons of basic iron it bought for delivery at its Lorain, Ohio, works and Follansbee Brothers Co., Pittsburgh, was able to secure 5000 tons of that grade at \$22, Valley furnace, higher prices now are sought, but up to this time no sales have been made at above \$22. There seems to have been some exaggeration of the demand for basic iron, as two Ohio steel makers, each credited with having inquired for 15,000 tons, have denied that they are in the market. There is a report here that the Central Steel Co., Massillon, Ohio, which recently inquired for a round tonnage of basic iron and then withdrew it, will be supplied with iron by the Ford Motor Co. The market seems to be slightly firmer on Bessemer iron, although the largest sale of the week of 3000 tons to an Allegheny Valley sheet maker was at the recent price of \$23, Valley furnace. Since this sale was made, however, there has been one of 600 tons at \$23.50, Valley furnace, and it is doubtful that less than this price now can be done. The Standard Sanitary Mfg. Co. was able to secure all of its 20,000-ton purchase at \$23, Valley furnace, or the equivalent of \$23, Valley furnace, for No. 2 grade. This iron is all for second quarter delivery and producers generally are asking \$24 base for that delivery and have succeeded in booking a very fair amount of business at that figure. It is admitted, however, that for prompt delivery \$24 cannot yet be obtained. Malleable and gray forge grades have moved up slightly in sympathy with other grades rather than because of a big demand. W. P. Snyder & Co. make the average price of Bessemer iron from Valley furnaces in January \$23 as against \$22.775 in December and of basic iron \$22 as compared with \$20.857 in December.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.76 per gross ton:

Basic .....	\$22.00 to \$23.00
Bessemer .....	23.00 to 24.00
Gray forge .....	22.50 to 23.00
No. 2 foundry .....	23.00 to 24.00
No. 3 foundry .....	22.50 to 23.00
Malleable .....	23.00
Low phosphorus, copper free....	29.00 to 30.00

**Ferroalloys.**—Recent reduction in the price of British ferromanganese to \$107.50, c.i.f. Atlantic seaboard, duty paid, which was met by the leading domestic producer, appears to have had the effect of stifling, instead of stimulating, the demand. It is general testimony of sellers here that the past week has been the poorest in point of sales of any in several months. Buyers evidently are waiting to see what the next change is going to be. Fresh activity in 50 per cent ferrosilicon is lacking, most consumers having covered their 1924 requirements. Not much activity is noted in spiegeleisen; quotations are unchanged, but there are intimations of price cutting on desirable inquiries. Prices are given on page 477.

**Semi-Finished Steel.**—Some irregularity is observed in sheet bar prices, although leading makers deny having gone below \$42.50, Pittsburgh or Youngstown, on recent business. United Alloy Steel Corporation, Canton, Ohio, recently closed for 5000 tons and was able to secure them at a delivered price equivalent to \$41, Youngstown. Pittsburgh and Youngstown makers disclaim having taken the business. There is a pretty steady demand for billets, but evidently supplies are ample, since the bulk of the business continues to be done at \$40, Pittsburgh or Youngstown, with occasional sales of small billets at \$42.50. No trouble is experienced in securing slabs at \$40, nor in finding forging

billets at \$45, base. Open market activities in scrap are limited. Some makers of rods are getting small orders from irregular customers; this suggests that some consumers are going outside their regular sources of supplies in an effort to weaken prices. In a general way, the rod market is quiet, but we note no important deviations from the regular price of \$51, base. An extra of \$2.50 a ton has lately been set up for orders of five tons or less of a size of rods. Leading independent here is operating 90 per cent of steel works capacity and Youngstown independents also have about 90 per cent of ingot capacity in operation. Carnegie Steel Co. continues above 90 per cent of capacity operations. Prices are given on page 477.

**Wire Products.**—The market shows a constant gain in activity. Improvement in the past week has been marked and some manufacturers note a considerable gain in forward buying. Several mills are urging buyers to get under cover on the ground that later when they need supplies they may find it difficult to secure them if the large amount of building and road construction now planned for the spring and summer has its usual effect upon the supply of wire mill labor. Buyers generally, however, appear to be more impressed by the excellent deliveries they now are getting than by the possibility that labor shortages later will make it hard to secure needed supplies except at higher prices. This makes it difficult for mills to build up backlog business, although some are fairly well off in this respect, due to the fact that some jobbers are ordering ahead, particularly in nails, in the belief that prices will go up before spring. Mill prices are holding well, but there is much irregularity in jobbing prices. In the Middle West low mill prices still are coming out on coated nails. Prices are given on page 476.

**Tubular Goods.**—Jobbers are ordering freely against their spring requirements of standard pipe and building up their stocks; a similar movement is on in oil country goods. So far, however, on account of unhampered mill operations and the free deliveries made possible by the open weather and excellent railroad service, few, if any, of the mills are falling behind their orders. Some weakness is noted in secondary prices, as there has not yet been much increase in consumptive buying, and in the effort to stimulate it, there has been much cutting of jobbing prices. This is not reflected in mill prices, which are as firm as ever, save occasional sales of line pipe made at concessions. The boiler tube market is extremely quiet and with the outlook poor for immediate improvement, observance of quoted prices is lax, this being particularly true of welded tubes. Discounts are given on page 476.

**Cold-Finished Steel Bars and Shafting.**—Experiences of makers in this district as to orders varies somewhat; while at least one producer had a record in production and shipments, the more common experiences were that while January showed material improvement over the two previous months, it fell considerably below the record of January last year. As a rule, buyers still are confining purchases close to known requirements and are ordering frequently instead of placing contracts against future needs. There is close observance of 3c., base, Pittsburgh, except that on business in competitive territory, freight is equalized with Chicago. Ground shafting holds at 3.40c., base, f.o.b. mill, for lots of a carload or more.

**Iron and Steel Bars.**—Mills in this district are holding very firmly to 2.40c., base Pittsburgh, for steel bars and are well provided with business for delivery over the next 30 to 45 days. There are intimations, however, that a considerable tonnage was taken in December, when the mills were in need of orders, at less than the open market price and the comparatively full engagement of bar mill capacity is in filling such orders. Prompt deliveries still are possible from most mills and on iron bars makers are promising shipments in one to two weeks. Iron bar makers are getting a fair run of business from agricultural implement manufacturers, but feel the lack of railroad buying.

We quote soft steel bars, rolled from billets, at 2.40c. base; bars for cold-finishing of screw stock analysis, \$3 per ton over base; reinforcing bars, rolled from billets, 2.40c. base; refined iron bars, 3.25c. base, in carload lots or more, f.o.b. Pittsburgh.

**Plates.**—Plate mill activities are not entirely in harmony with reports from plate consuming industries. There is very little railroad car business in sight for local shops and about the only large business up is from the Government. Orders for oil storage tanks are pretty well completed and there is not much tendency yet to build against future demands until there is positive evidence of a change in the oil situation and a more definite prospect of orders. Plate prices are given on page 476.

**Hot-Rolled Flats.**—There seems to be some idle capacity for rolling the lighter and narrower-gaged material and some mills are going below the regular price of 3c. base to secure tonnages. Other mills, however, are taking advantage of the situation to roll cotton ties and thus avoid the necessity of shading prices to obtain business. As a general rule, mills have a fair complement of first quarter business and specifications are reported to be satisfactory. Prices are given on page 476.

**Cold-Rolled Strips.**—Apparently there is not enough business to go around and a price of 4.75c., base Pittsburgh, has appeared in several parts of the country, notably in New England and the Middle West. Mills generally still regard 5c., base Pittsburgh, as the market price, but few of them are letting regular customers slip away at the lower level. The market is quotable at from 4.75c. to 5c., base Pittsburgh.

**Bolts, Nuts and Rivets.**—Although the recent advance in bolts and nuts as yet has found no basis in sales, since practically all buyers were covered by contracts at lower figures, the market is firmer than it has been and the average of prices received by makers is somewhat higher than over the last quarter of last year. The rivet market, however, still is weak because there is not enough demand to provide all makers a share and competition for business consequently is very sharp. On large lots \$2.75 base is the top of the market, and we note sales as low as \$2.60 base. Quotations of \$2.90 base for large rivets and 65 and 10 per cent off list for small rivets refer entirely to small lots. Prices and discounts are given on page 476.

**Sheets.**—In the business of the past month, the American Sheet & Tin Plate Co. fared somewhat better than did its competitors and it starts the new month with a good sized order book. Independent bookings last month suffered from the fact that so much tonnage was entered in December, in most cases at less than the regular market prices. Independent prices stiffened after the heavy December bookings and the leading producer profited by the passing of price competition. Operating at somewhat under 75 per cent of capacity, its orders exceeded its shipments and it accumulated much business for rolling this month and next. Independent operations, which have been about 80 per cent of capacity, now are above that point. Most mills now are quoting 3.35c., base, for black, 5c. base, for galvanized, 3c., base, for blue annealed, and 5.35c., base (22 gage), for automobile body stock, but lower prices, at which much December business was taken, have not entirely disappeared. Prices are given on page 476.

**Tin Plate.**—Specifications against contracted tonnages are rolling in freely and without prompting on the part of the mills. Although the leading producer last month operated at the highest possible physical rate and shipped with great freedom, its orders exceeded shipments and much January business thereby becomes a future obligation. Independent makers also had a big month in production and shipments. The price is a fixture at \$5.50 per base box, Pittsburgh, for standard cokes; this, of course, implies the usual preferential to large consumers, but it is doubtful whether any of the mills would take new business for delivery over the remainder of this half year at below the full price.

**Structural Material.**—Mills are well provided with business, but are not so heavily committed that they are extending delivery promises or passing up new business on the score of inability to make deliveries. It is evident that the fabricating companies are anticipating their requirements to some extent because of the brilliant construction prospect for this year, as there

is considerable building up of stocks at local fabricating shops. The price situation is unchanged. Prices are given on page 476.

**Steel Rails.**—The light rail market is unsettled and weak. Demand is very limited and there is keen competition for orders, particularly those that embrace a fair-sized tonnage. The market is no longer quotable above 2.15c., base, for billet rails and as low as 2c. has been quoted on what ordinarily would be considered small tonnages.

We quote light rails rolled from billets at 2c. to 2.15c. base (25-lb. to 45-lb.); rerolled rails, 1.85c. to 2c. base (12-lb. to 45-lb.), f.o.b. mill; standard rails, \$43 per gross ton mill, for Bessemer and open-hearth sections.

**Bessemer Ferrosilicon and Silveries.**—An advance of \$1 per ton on Bessemer ferrosilicon and silvery iron has been made by Jackson, Ohio, producers, putting 10 per cent ferrosilicon to \$42.50, furnace, and 6 per cent silveries to \$31, furnace. Prices are given on page 477.

**Coke and Coal.**—While the beehive oven furnace coke market shows a stronger tendency for spot tonnages, it is somewhat weaker than it has been on supplies for shipment from now to the end of the first half of the year. A contract has just been made by Valley furnace interests for 15,000 tons a month to run to July, one at \$4.25 per net ton at ovens, which is at least 15c. a ton below what recently has been asked on tonnages for that delivery. A central Pennsylvania steel company has inquired for 15,000 tons a month for second quarter shipment. This interest recently closed for about 1000 tons of spot furnace coke and paid \$4.15 per net ton at ovens. We also note a contract for a round tonnage for February delivery at \$4. The spot market is quotable from \$4 to \$4.15 and second quarter contracts at \$4.25. Demand for foundry coke is steady but with supplies ample, there is no reason for changing the recent range of prices of \$4.75 to \$5.50 on standard grades. It now appears that the struggle between the union coal mine operators and the United Mine Workers of America will be on the question of the duration of the new agreement and while there is a possibility of a suspension of union mine operations during the negotiations, there is much less strike talk than recently. Less stocking of coal is going on and the market is rather soft. We quote mine run steam coal at \$1.60 to \$2 per net ton at mines; coking grade from \$1.75 to \$2.15 and gas coal from \$2.25 to \$2.50.

**Old Material.**—This market still exhibits a fair degree of strength, but, as was the case recently, this finds its explanation in the strength of outside and competing markets rather than in a big demand here. A local steel maker recently bought a fair-sized lot of heavy melting steel at \$22 and there is more of that grade available at the same figure. Less probably could not be done in face of more remunerative prices on shipments elsewhere and we continue that grade at \$22. The Baltimore & Ohio Railroad opened bids Feb. 4, on 20,165 gross tons of scrap. This is a very heavy list for this road, but is accounted for by the fact that it represents about four months' accumulation.

We quote for delivery to consumers' mill in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

Per Gross Ton	
Heavy melting steel.....	\$22.00
No. 1 cast, cupola size.....	\$21.50 to 22.00
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.....	23.00 to 23.50
Compressed sheet steel.....	19.50 to 20.00
Bundled sheets, sides and ends..	18.00 to 18.50
Railroad knuckles and couplers..	23.50 to 24.00
Railroad coil and leaf springs..	23.50 to 24.00
Low phosphorus blooms and billets ends.....	25.00 to 25.50
Low phosphorus plate and other material.....	24.00 to 24.50
Railroad malleable.....	19.50 to 20.00
Steel car axles.....	23.50 to 24.00
Cast iron wheels.....	19.50 to 20.00
Rolled steel wheels.....	23.00 to 24.00
Machine shop turnings.....	16.50 to 17.00
Sheet bar crops.....	23.00 to 24.00
Heavy steel axle turnings.....	19.00 to 20.00
Short shoveling turnings.....	17.50 to 18.00
Heavy breakable cast.....	20.00 to 21.00
Stove plate.....	16.00 to 17.00
Cast iron borings.....	17.50 to 18.00
No. 1 railroad wrought.....	18.00 to 18.50
No. 2 railroad wrought.....	22.00

## Chicago

### Bookings of Heavier Products Exceed Shipments, While Others Lag

CHICAGO, Feb. 5.—January bookings of local mills rolling the heavier products greatly exceeded shipments. Soft steel bar commitments were particularly heavy. Demand for the lighter forms of finished material, such as wire products and bolts and nuts, still tends to lag. Specifications for nails and wire are showing some increase as spring approaches, but buyers are not stocking ahead, as they know that early deliveries are still available from the mills and they see no prospects of price advances. Sheets are not yet altogether steady as to price, although local mills are well booked, one producer being sold out for the quarter. Concessions are apparently coming from outside mills which have not yet accumulated such heavy backlogs.

Prospects for car buying are favorable, although no important orders have been reported during the current week. Fabricating awards have been large and pending building business involves a large tonnage. Buying by the automobile industry continues to be an outstanding feature of the market and implement makers are taking more steel, as well as pig iron. The trade does not look for advances in steel prices and consequently current business, except in rails and track supplies, is for early delivery and covers specific needs. A development of interest is the appearance of inquiries for substantial tonnages of shapes and plates from Japan and South America. Local mill and blast furnace operations are unchanged.

**Ferrolloys.**—The break in ferromanganese to \$107.50, seaboard, has failed to develop business. Most users here are covered through the first half. There seems to be some doubt as to whether spiegeleisen can still be obtained from foreign sources at less than domestic prices. Sales of carlots of domestic material have been made at \$40, Eastern furnace, or \$48.58 delivered. The domestic price on larger quantities is \$1 less.

We quote 80 per cent ferromanganese, \$115.06, delivered; 50 per cent ferrosilicon, \$75, delivered; spiegeleisen, 18 to 22 per cent, domestic, \$46.31 to \$48.58, delivered.

**Pig Iron.**—Local iron has advanced to a minimum of \$24.50, base furnace, on a steady but nevertheless rather quiet market. Spot buying is notably inactive, although purchases for 30- to 60-day or more extended shipment are in fair volume. Of particular interest is a revival of activity among farm implement manufacturers. The leading implement maker has put out inquiries for 500 tons each of Northern and Southern foundry for a plant in the Chicago district, and 1500 tons of foundry and 750 tons of malleable for Springfield, Ohio, both lots being for second quarter shipment. A Wisconsin implement manufacturer has closed for 2400 tons of foundry and malleable and 300 tons of silvery for delivery over the next four months. A Michigan automobile maker has placed 1000 tons of foundry with the Soo furnace for second quarter shipment. A Michigan stove maker is inquiring for 500 tons of foundry for second quarter. A local electrical equipment company wants 1000 tons of foundry for the same period. A Chicago sanitary ware producer is in the market for 400 tons of foundry for shipment over the remainder of the first half. Little Southern iron is penetrating into this territory, although we note two sales at \$23, base Birmingham, aggregating 500 tons. As low as \$22.50, base Birmingham, is still quoted in some instances, although most furnaces are holding to \$23 and at least one has advanced to \$23.50. All makers of silvery have now advanced \$1 a ton, making the delivered price on 8 per cent \$38.29. An early advance in charcoal is looked for. Merchant blast furnace operations in the Chicago district remain unchanged and

while stocks on furnace yards are slowly being reduced there are no plans to add to present active capacity.

Quotations on Northern foundry high phosphorus malleable and basic irons are f.o.b. local furnace and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumer's yard or, when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago..	\$29.15
Northern coke, No. 1, sil. 2.25 to 2.75 .....	25.00
Northern coke, foundry, No. 2, sil. 1.75 to 2.25 .....	24.50
Malleable, not over 2.25 sil. ....	24.50
Basic .....	24.50
High phosphorus .....	24.50
Southern No. 2 .....	\$28.51 to 29.61
Low phos., sil. 1 to 2 per cent, copper free .....	33.00 to 34.29
Silvery, sil. 8 per cent .....	33.29

**Plates.**—Although railroad car buying continues to be the main source of plate tonnage, demand from other sources is more active. An inquiry from Japan calls for 7300 tons for boat construction. A local fabricator is in the market for 6000 tons for oil storage tanks for erection at San Pedro, Cal. Mills are still able to make satisfactory deliveries and prices are firm at 2.60c. base, Chicago.

The mill quotation is 2.60c., Chicago. Jobbers quote 3.30c. for plates out of stock.

**Bars.**—Soft steel bar bookings of local mills in January were nearly twice those of the previous month, although even in December new commitments exceeded shipments. Buying by the automobile industry is the salient feature of the market, although demand from other sources is also expanding. Specifications from the farm implement manufacturers are still far from normal but the important point is that they are steadily increasing. Operations among implement plants have generally improved, although not uniformly, some of them running as high as 80 per cent of capacity with others as low as 50 per cent. Bar commitments of local mills are heavier than in plates or structural shapes and bar deliveries are no longer so prompt as during recent months. Soft steel bars are firm at 2.50c., base Chicago. A decided contrast is found in the bar iron situation. Iron mills are booking barely enough to sustain operations and nothing resembling a revival in demand is in sight. Rail steel bar mills, on the other hand, are comfortably obligated as the result of heavier orders from the implement industry and fence post makers as well as a normal run of business from bed manufacturers and reinforcing bar distributors.

Mill prices are: Mild steel bars, 2.50c., Chicago; common bar iron, 2.40c., Chicago; rail steel, 2.30c., Chicago mill.

Jobbers quote 3.20c. for steel bars out of warehouse. The warehouse quotations on cold-rolled steel bars and shafting is 4c. for rounds and 4.50c. for flats, squares and hexagons.

Jobbers quote hard and medium deformed steel bars at 2.75c. to 3c. base; hoops, 4.45c.; bands, 3.95c.

**Bolts and Nuts.**—Specifications have improved, but they are still far from satisfactory. Jobbers are particularly slow in placing their requirements. Discounts are firm, but this may be due to the fact that they have undergone no real test, owing to the paucity of new business. The operations of bolt and nut plants range from 65 to 70 per cent on the average. Prices are those on page 476, except that in this territory they are on a f.o.b. Chicago base.

Jobbers quote structural rivets, 3.75c.; boiler rivets, 3.95c.; machine bolts up to ¾ x 4 in., 55 and 5 per cent off; larger sizes, 55 and 5 off; carriage bolts up to ¾ x 6 in., 50 and 5 off; larger sizes, 50 and 5 off; hot pressed nuts, squares and hexagons, tapped, \$3.50 off; blank nuts, \$3.50 off; coach or lag screws, gimlet points, square heads, 60 and 5 per cent off.

**Sheets.**—Local producers are well booked; in fact, the independent mill is completely committed for this quarter and expects to open its books for second quarter about the middle of this month. Notwithstanding their excellent position, it is still possible to obtain price concessions from a few mills located outside this district. Occasional quotations of as low as 4.90c., base Pittsburgh, on galvanized, 3.75c. on black and 2.90c. on blue annealed are still reported. Present business is

mainly from domestic sources. Although small inquiries continue to be received from Japan, it is apparent that that country is now more interested in heavier materials required to carry out its permanent reconstruction program.

Mill quotations are 3.85c. for No. 28 black, 3c. for No. 10 blue annealed and 5c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 34c. per 100 lb. Jobbers quote, f.o.b. Chicago, 4c. for blue annealed, 4.70c. for black and 5.85c. for galvanized.

**Cast Iron Pipe.**—Milwaukee has awarded 1450 tons to the United States Cast Iron Pipe & Foundry Co. and 1050 tons to the American Cast Iron Pipe Co. The United States company has also booked 350 tons for Athens, Wis., and 145 tons for Two Rivers, Wis. New Holstein, Wis., has awarded 450 tons of DeLavaud centrifugal pipe to the National Cast Iron Pipe Co. Mankato, Minn., has rejected bids on 400 tons. The price quotation shows no change, although one maker is now holding to a minimum of \$48 base, Birmingham, on all sizes.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$60.20 to \$61.20; 6-in. to 10-in., inclusive, \$56.20 to \$57.20; 12-in. and above, \$55.20; class A and gas pipe, \$5 extra.

**Rails and Track Supplies.**—Current orders for track supplies are numerous, but small. There are still a number of Western lines which have not yet covered for their major rail and fastening requirements for the coming year. Notable among them is the Rock Island.

Standard Bessemer and open-hearth rails, \$43; light rails, rolled steel, 2.25c., f.o.b. makers' mills. Standard railroad spikes, 3.10c. mill; track bolts with square nuts, 4.10c. mill; steel tie plates, 2.60c., f.o.b. mill; angle bars, 2.75c., f.o.b. mill. Jobbers quote standard spikes out of warehouse at 3.75c. base, and track bolts, 4.75c. base.

**Structural Material.**—Fabricating awards for the week were heavy, amounting to over 12,000 tons. The two largest lettings were train sheds for the Chicago Union Station Co. involving 5000 tons, and a bridge at Pueblo, Colo., requiring 2200 tons. Prospects are promising with bids going in this week on the New Palmer House, Chicago, requiring 17,000 tons and with other important projects coming up for figures, including Masonic temple building at St. Louis and St. Paul, involving 4500 tons and 3000 tons respectively. Plans for a large Masonic temple at Chicago are in progress. Mills are encouraged not only by the volume of fabricating activity in this territory but by the appearance of inquiries for plain material from foreign countries. They have been asked to figure on 10,000 tons of plain material for railroad bridge work in Argentina. An inquiry for 1500 tons from Japan indicates that permanent reconstruction work in that country is now being undertaken. Owing to high freight rates from Chicago, however, it is probable that this export business, if placed in this country, will go to mills nearer the seaboard. Plain material remains firm at 2.60c. base Chicago.

The mill quotation on plain material is 2.60c., Chicago. Jobbers quote 3.30c. for plain material out of warehouse.

**Wire Products.**—Specifications, although in fair volume, are below expectations. The situation is explained by the fact that neither jobbers nor dealers are accumulating stocks, finding it unnecessary to do so as long as early deliveries are available and price advances do not appear to be imminent. The approach of spring, however, is slowly making itself felt in heavier demands for seasonal goods. Specifications for poultry netting are now coming in and will continue to be received for at least two months. Demand for woven wire fence will probably be active until May and barbed wire specifications are improving. Nail buying has been heavy and less subject to seasonal influences than ordinarily. Railroad purchases are increasing, covering wire fence and barbed wire, as well as nails for car repair work. For mill prices, which are unchanged, see page 476.

We quote warehouse prices f.o.b. Chicago: No. 6 to No. 9 bright basic wire, \$3.90 per 100 lb.; extra for black annealed wire, 15c. per 100 lb.; common wire nails, 3.65c. to 3.80c. per 100 lb.; cement coated nails, 3.10c. to 3.25c. per keg.

**Reinforcing Bars.**—Actual lettings are surprisingly few, in view of the large amount of work that is being figured. Sellers are still confident that most of this

pending business will be closed, but in the meantime the price situation is still flexible, with the market ranging from 2.75c. to 3c., Chicago warehouse. Among current awards a number involve rather large tonnages. For the Peabody Hotel, Memphis, Tenn., 1200 tons of rail steel bars will be supplied by the LaCled Steel Co. This steel was bought for mill shipment at a reported price of 2.40c. delivered. Joseph T. Ryerson & Son, Chicago, will furnish 850 tons for a dam at Danville, Ky. Owing to a change of design, only 150 tons of reinforcing was bought for the Board of Trade Building, Kansas City, Mo., which originally called for 700 tons.

#### Awards include:

Peabody Hotel, Memphis, Tenn., 1200 tons of rerolled bars to LaCled Steel Co.  
Middle West Utilities Co. dam, Danville, Ky., 850 tons to Joseph T. Ryerson & Son.  
Central Cold Storage Co. building, Blue Island, Ill., 330 tons to Corrugated Bar Co.  
Chicago, Indianapolis & Louisville Railroad, freight house, Indianapolis, 260 tons to Corrugated Bar Co.  
Wayne Medical building, Fort Wayne, Ind., 175 tons to Hugh J. Baker, Indianapolis.  
Board of Trade building, Kansas City, Mo., 150 tons to Kansas City Bolt & Nut Co.  
Illinois Bell Telephone Co., Superior Exchange building, Chicago, 114 tons to Joseph T. Ryerson & Son.

#### Pending work includes:

Sheridan Trust & Savings Bank building, Chicago, 135 tons.  
Riding Club building, Chicago, 200 tons.

**Old Material.**—The leading independent steel works has placed 25,000 tons of heavy melting, most of it at \$18.50 delivered. An additional purchase of a few thousand tons for the Gary mill was negotiated at \$18 delivered. The prices obtained on these sales were disappointing to the trade, which had looked for further advances. The view is now gaining ground, however, that the market has reached the peak on this swing. Frogs, switches and guards, ordinarily sold on a parity with heavy melting, are now bringing a premium owing to heavier demand. Iron mill grades are inactive and weaker, while cast scrap has advanced. Further purchases of cast borings and short turnings by blast furnaces have resulted in higher prices on those grades. In general, however, prices are unchanged. Railroad offerings include the Pennsylvania, Southwestern Region, 3000 tons; St. Paul, 1600 tons; Pennsylvania, Northwestern Region, 1200 tons; Pullman Co., 1200 tons, and the New York Central, the Michigan Central and the Erie, blind lists.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton
Iron rails	\$21.00 to \$21.50
Cast iron car wheels	20.50 to 21.00
Relaying rails 56 and 60 lb.	26.00 to 27.00
Relaying rails, 65 lb. and heavier	32.00 to 35.00
Forged steel car wheels	21.00 to 21.50
Railroad tires, charging box size	21.50 to 22.00
Railroad leaf springs, cut apart	21.50 to 22.00
Rails for rerolling	19.50 to 20.00
Steel rails, less than 3 ft.	20.50 to 21.00
Heavy melting steel	18.00 to 18.50
Frogs, switches and guards cut apart	18.50 to 19.00
Shoveling steel	17.50 to 18.00
Drop forge flashings	13.50 to 14.00
Hydraulic compressed sheets	15.25 to 15.75
Axle turnings	15.50 to 16.00
Steel angle bars	13.50 to 20.00

	Per Net Ton
Iron angle and splice bars	19.50 to 20.00
Iron arch bars and transoms	19.50 to 20.00
Iron car axles	27.00 to 27.50
Steel car axles	19.00 to 19.50
No. 1 busheling	14.00 to 14.50
No. 2 busheling	10.00 to 10.50
Cut forge	16.00 to 16.50
Pipes and flues	12.00 to 12.50
No. 1 railroad wrought	15.00 to 15.50
No. 2 railroad wrought	16.00 to 16.50
Steel knuckles and couplers	19.25 to 19.75
Coil springs	20.50 to 21.00
No. 1 machinery cast	21.00 to 21.50
No. 1 railroad cast	20.00 to 20.50
No. 1 agricultural cast	19.50 to 20.00
Low phos. punchings	17.00 to 17.50
Locomotive tires, smooth	18.00 to 18.50
Machine shop turnings	10.00 to 10.50
Cast borings	14.00 to 14.50
Short shoveling turnings	14.00 to 14.50
Stove plate	17.00 to 17.50
Grate bars	16.00 to 16.50
Brake shoes	17.00 to 17.50
Railroad malleable	19.25 to 19.75
Agricultural malleable	18.50 to 19.00

## New York

### Increased Buying of Pig Iron—Drop in Structural Activity—Pipe Strong

NEW YORK, Feb. 5.—Following the fair activity of pig iron of the preceding two weeks, an increased volume of business was transacted last week and the first two days of this week, amounting to about 30,000 tons. The principal buyer was a cast iron pipe company, which bought from 15,000 to 20,000 tons for second quarter delivery. While some of the tonnage recently sold to a pump company was on a basis of \$22, furnace, for No. 2 plain, the market is now considerably firmer and \$22.50 is believed to be the bottom price. In eastern Pennsylvania some sales have been made at \$23. Nearly all of the buying is for second quarter. For second quarter, the quotation is generally 50c. higher than for earlier delivery. In Buffalo the ruling quotation for either first or second quarter is \$22, furnace, for No. 2 plain. Virginia iron is usually quoted at \$26. Foreign iron is receiving some consideration and it is believed in some quarters that a larger tonnage than is generally supposed has been imported since Jan. 1, but recently all of the tonnage has been of high phosphorus Continental iron, and there does not seem to be much prospect of foundry grades being imported. One of the difficulties is the frequent change of exchange rates and quotations abroad. In one case, within a few days, while negotiations were pending, the price c.i.f. New York advanced \$1.

We quote delivered in the New York district as follows, having added to furnace price \$2.27 freight from eastern Pennsylvania, \$4.91 from Buffalo and \$5.44 from Virginia:

East. Pa. No. 1X fdy., sil. 2.75 to 3.25	\$25.77 to \$26.27
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	25.27 to 25.77
East. Pa. No. 2, sil. 1.75 to 2.25	24.77 to 25.27
Buffalo, sil. 1.75 to 2.25	26.91
No. 2X Virginia, sil. 2.25 to 2.75	30.44
No. 2 Virginia, sil. 1.75 to 2.25	31.44

**Ferroalloys.**—One domestic producer of ferromanganese after the announcement last week of the reduction in the British price to \$107.50, seaboard, offered the alloy at \$106.50, basis seaboard, and it is understood some business was taken at that price. There have been sales also of both British and domestic alloy, mostly carload lots, at \$107.50, seaboard, but inquiry is not large. The spiegeleisen market is unchanged and demand is only fair. There have been no developments in the ferrosilicon or ferrochromium markets.

**Cast-Iron Pipe.**—Demand is rapidly developing for all sizes of water pipe that suggests a parallel with the opening months of last year. Purchasing by privately owned companies continues large and it is expected that this business will be supplemented before very long by the usual tenders of municipalities in the New England district. At the opening of bids by the Department of Water Supply, Gas and Electricity, New York, Jan. 31, on about 12,000 tons of water pipe and fittings, the following prices were announced: On 400 tons of 4-, 6-, 8-, and 12-in. pipe, Warren Foundry & Pipe Co., \$62.95 per ton and the United States Cast Iron Pipe & Foundry Co., \$63.90 per ton; on 3200 tons of 4-, 6-, 8-, 12-, 30- and 36-in. pipe, Warren Foundry & Pipe Co., \$62.95 per ton and the United States Cast Iron Pipe & Foundry Co., \$63.90 per ton; on 4140 tons of 6-, 8-, 12-, 16- and 20-in. pipe, United States Cast Iron Pipe & Foundry Co., \$62.90 per ton; on 2780 tons of 4-, 6-, 8- and 12-in. pipe, United States Cast Iron Pipe & Foundry Co., \$63.90 per ton and John Fox & Co., \$63.80 per ton; on 1190 tons of 6-, 8-, 12- and 36-in. pipe, United States Cast Iron Pipe & Foundry Co., \$63.90 per ton and R. D. Wood & Co., \$62.62 per ton. We quote per net ton, f.o.b. New York, in carload lots as follows: 6-in. and larger, \$61.60 to \$63.60; 4-in. and 5-in., \$66.60 to \$68.60; 3-in., \$76.60 to \$78.60, with \$5 additional for Class A and gas pipe. The soil pipe market has strengthened with the

withdrawal of the 35% per cent and 45% per cent discounts from list on light and heavy 6-in. pipe. Jobbers are showing a greater desire than usual to book good-sized tonnages for delivery during the spring, in some cases deferring shipments until June. Makers are well-filled for about six weeks ahead. We quote discounts of both Southern and Northern makers, as follows: 6-in., 29½ to 30% per cent off list; heavy, 39½ to 40% per cent off list.

**Finished Iron and Steel.**—No special significance is attached by the trade to the fact that structural steel inquiries and lettings have dropped off considerably in the past week. Many of the local fabricating shops have enough work on hand to keep them busy for months and competition for jobs at the prices which have been ruling recently is not so keen. Fabricators see work ahead to keep their shop capacities well engaged through the first half of the year at least. The general run of steel business is of the same character as that which has been done since the first of the year. Orders are small but fairly plentiful in most lines, and while there is occasional yielding of prices on the plates, shapes and bars, other items are firm. Bars are subject to concessions less frequently than plates and shapes, and plates are weaker than shapes. Plates are obtainable from 2.35c. to 2.40c., Pittsburgh, and while the same prices have been quoted on shapes, mills seem less anxious for orders at less than 2.40c., and on small quantities 2.50c. is often the quotation. Pipe is in the strongest position of any steel product. Some of the mills are to a degree apportioning their tonnage among regular customers. There may not be enough galvanized pipe to go around if present demands continue. Mill representatives express themselves as well satisfied with the outlook for every product except plates. While there has been a steady improvement in the demand for plates since the first of the year, mills are nowhere near capacity production and there is keen competition for orders. The average plate production in the East is probably not above 35 to 40 per cent, although a few mills are doing better than the top figure. Jobbers are buying all products freely but carefully, their orders running smaller in quantity than is usual at this time of the year.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, 2.74c.; plates, 2.69c. to 2.84c.; structural shapes, 2.74c. to 2.84c.; bar iron, 2.74c.

**Warehouse Business.**—Heavy buying out of stock has not yet materialized, but prices continue firm on practically all products and there is a fair volume of business. Effort is being made to strengthen the market on black and galvanized sheets, where shading of quoted prices is still prevalent. Warehouses handling structural material report a fair volume of small sales. We quote prices on page 496.

**Coke.**—Consumers of furnace coke, after having delayed heavy purchases as long as possible in anticipation of a lower market, have been buying and quotations are slightly stronger on this grade. Foundry coke is unchanged, holding firmly at \$5 to \$5.50 per ton for prompt shipment carloads. Standard furnace, while still obtainable at \$4 per ton, ranges up to \$4.50 per ton. By-product is quoted at \$10.91, Newark and Jersey City, N. J.

**Old Material.**—Prices are firm and in some grades show slight advances. No. 1 heavy melting steel is going forward to a consumer in Pottsville at \$19.50 per ton, while \$19 per ton is being paid on railroad grade, delivered Sparrows Point, Md. Railroad grade of heavy melting steel delivered elsewhere in eastern Pennsylvania is bringing \$18.25 and \$18.50 per ton from dealers. Reports are current of high prices being paid for heavy melting steel, borings and turnings and other grades of scrap, but cannot be confirmed. Machine shop turnings are being purchased for a consumer in Harrisburg, Pa., at \$16 per ton delivered, while shipment to another eastern Pennsylvania consumer brings \$15.50 per ton delivered, a more advantageous price in view of the lower freight rate. Pipe is strong at \$17.50 per ton delivered to Lebanon, Pa., and \$18 per ton delivered Milton, Pa. Stove plate is being purchased for shipment to a Harrisburg consumer and to foundries in

New Jersey at from \$13.50 to \$14.50 per ton, f.o.b. New York. Despite some feeling of uncertainty as to the future course of the market, there is evident a tone of optimism.

Buying prices per gross ton New York follow:

Heavy melting steel, yard.....	\$14.50 to \$15.00
Steel rails, short lengths, or equivalent .....	15.50 to 16.00
Rails for rolling.....	18.00 to 19.00
Relaying rails, nominal.....	25.00 to 26.00
Steel car axles.....	18.00 to 19.00
Iron car axles.....	25.00 to 26.00
No. 1 railroad wrought.....	17.00 to 17.50
Forge fire.....	11.50 to 12.50
No. 1 yard wrought, long.....	15.00 to 16.00
Cast borings (clean).....	12.00 to 12.25
Machine-shop turnings.....	12.25 to 12.75
Mixed borings and turnings.....	12.00 to 12.50
Iron and steel pipe (1 in. diam., not under 2 ft. long).....	13.75 to 14.25
Stove plate.....	13.50 to 14.50
Locomotive grate bars.....	15.00 to 15.50
Malleable cast (railroad).....	16.00 to 17.00
Cast iron car wheels.....	15.50 to 16.00

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:

No. 1 machinery cast.....	\$20.00 to \$21.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	19.00 to 20.00
No. 1 heavy cast, not cupola size.....	15.50 to 16.50
No. 2 cast (radiators, cast boilers, etc.).....	17.00 to 18.00

## St. Louis

### Moderate Buying of Pig Iron From Chicago Furnaces at Higher Prices

ST. LOUIS, Feb. 5.—Most of the orders for pig iron placed during the last week went to Chicago furnaces, which sold direct to the melters. These included 1000 tons of malleable for an East Side melter and the same amount of this grade to a St. Louis concern, and 300 tons of foundry iron to a Kansas City user. The St. Louis Coke & Iron Co. sold 1600 tons of special wheel iron. This maker had one of the largest months in its history from the standpoint of shipments during January, due to heavily anticipated shipments against contracts, a condition that still prevails. Because of a big order file, they are now quoting \$25.50 to \$26, f.o.b. Granite City. Inquiries are rather scarce. A Kansas City melter wants 300 tons of basic iron, and an Indiana melter wants 300 to 500 tons of foundry iron. Northern iron advanced to \$24.50, Chicago, and Southern to \$23, Birmingham. Makers contend that the demand for pig iron and the cost of manufacture justify higher prices.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.16 freight from Chicago \$3.28 from Birmingham (rail and water), \$5.17 from Birmingham, all rail, and 81 cents average switching charge from Granite City:

Northern fdy., sil. 1.75 to 2.25.....	\$26.66
Northern malleable, sil. 1.75 to 2.25.....	26.66
Basic.....	26.66
Southern fdy., sil. 1.75 to 2.25 (rail).....	28.17

**Finished Iron and Steel.**—It has been a very quiet week. The only railroad inquiry—3500 kegs of track spikes for the Missouri-Kansas-Texas Railway—was withdrawn at once. The inquiry of the Missouri Pacific for about 10,000 tons of tie plates is still pending, and there is considerable speculation as to whether or not it will be materially reduced. There is no business to speak of from warehouses or manufacturers using steel products. No new business in structural steel in St. Louis is in immediate prospect.

For stock out of warehouse we quote: Soft steel bars, 3.35c. per lb.; iron bars, 3.35c.; structural shapes, 3.45c.; tank plates, 3.45c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, cold-rolled, one pass, 4.85c.; cold drawn rounds, shafting and screw stock, 4.70c.; structural rivets, 4.15c.; boiler rivets, 4.35c.; tank rivets,  $\frac{1}{4}$ -in. and smaller, 50-5 per cent off list; machine bolts, 45-5 per cent; carriage bolts, 40-5 per cent; lag screws, 50-5 per cent; hot pressed nuts, squares or hexagon blank, \$2.50, and tapped, \$2.50 off list.

**Coke.**—The cold weather has tended to help the sale of coke for heating purposes, but there has been little call for foundry grades. Piles in yards of producers and dealers are heavy, and it is likely that the amount carried over will be very heavy. The only thing that can help the coke situation is a coal strike.

**Old Material.**—The old material market made further advances during the last week. Cast iron car wheels advanced \$1, putting that item more in line with other cast grades. Other advances ranged from 50c. to \$1. Specialties are mostly in demand, and some heavy tonnages were sold during the week. Rolling mill grades are becoming more in demand. Principal interest in railroad lists during the week was that of the Missouri Pacific, 4500 tons, which brought good prices. Heavy lists predominate. New lists include: Baltimore & Ohio, 19,000 tons; Pennsylvania System, Pittsburgh district, 8000 tons; Central district, 7000 tons, and Southwestern district, 3000 tons; Mobile & Ohio, 2500 tons; Chicago, Milwaukee & St. Paul, 1500 tons, and Alabama & Vicksburg, 200 tons.

#### Per Gross Ton

Iron rails.....	\$18.00 to \$18.50
Rails for rolling.....	19.50 to 20.00
Steel rails, less than 3 ft.....	20.00 to 20.50
Relaying rails, 60 lb. and under.....	25.00 to 26.00
Relaying rails, 70 and over.....	32.50 to 33.50
Cast iron car wheels.....	21.00 to 21.50
Heavy melting steel.....	17.50 to 18.00
Heavy shoveling steel.....	17.00 to 17.50
Frogs, switches and guards cut apart.....	19.00 to 19.50
Railroad springs.....	21.50 to 22.00
Heavy axles and tire turnings.....	14.00 to 14.50

#### Per Net Ton

Steel angle bars.....	16.50 to 17.00
Steel car axles.....	20.50 to 21.00
Iron car axles.....	27.00 to 27.50
Wrought iron bars and transoms.....	22.00 to 22.50
No. 1 railroad wrought.....	16.50 to 17.00
No. 2 railroad wrought.....	16.00 to 16.50
Cast iron borings.....	11.50 to 12.00
No. 1 busheling.....	15.50 to 16.00
No. 1 railroad cast.....	19.50 to 20.00
No. 1 machinery cast.....	19.50 to 20.00
Railroad malleable.....	17.00 to 17.50
Machine shop turnings.....	10.50 to 11.00
Champion bundled sheets.....	10.50 to 11.00

## Buffalo

### Inquiries for Pig Iron Foot Up 25,000 Tons—Optimism Among Mills

BUFFALO, Feb. 5.—The pig iron market shows the evidences of continued purchasing. Melter throughout the week have inquired for a total of 25,000 tons. One of the inquiries is for 2500 tons of foundry and another is for 1500 tons. Carload inquiry is pouring in in heavy volume, and all of the furnaces are accepting a little for first and second quarter delivery, though most of the iron being inquired for is for second quarter. One furnace which is sold through till April 1 is not accepting business for the current quarter and is quoting \$23 minimum on second quarter inquiries. General demand is from nearly every consuming district in the East and Middle West, and some inquiries are from even more remote sources. Aggregate buying has been at least 20,000 tons. Furnace quotations are \$22 to \$23, with the lower figure being done on round tonnage by some furnaces. One maker has established the \$23 minimum for first quarter delivery and \$22 for second quarter delivery.

We quote f.o.b. gross ton, Buffalo, as follows:

No. 1 foundry, sil. 2.75 to 3.25.....	\$23.00 to \$23.50
No. 2 foundry, sil. 2.25 to 2.75.....	22.50 to 23.00
No. 2 plain, sil. 1.75 to 2.25.....	22.00 to 22.50
Basic.....	22.00 to 23.00
Malleable.....	22.00 to 23.00
Lake Superior charcoal.....	29.28

**Finished Iron and Steel.**—Mills note a more cheerful feeling in the market for finished goods and some improvement in inquiry and sales in nearly every class. Though tonnage placed is not heavy, nearly every purchaser wants some material, and mills classify the diversified inquiry as a healthy sign. January business was better than December and the last two weeks of January better than the first two weeks. Deliveries are becoming more extended, showing that backlogs are growing. Bar and shape business is noticeably on the mend with the size of inquiries increasing. This has been a remarkable winter for reinforcing bar makers, the demand having been sustained through the cold weather. The Pillsbury Flour Mills Co. job, consisting

of 150 to 200 tons for a marine tower on an elevator, has not yet been awarded. Several jobs, all less than 100 tons, have been allotted to the Corrugated Bar Co. The price is firm at 2.65c., Pittsburgh. Fabricated business is slow. Sheet business is satisfactory with the black price firm at 3.85c. and galvanized at 5c. Wire business is making a good showing with seasonal business beginning to accumulate. Cold-rolled business is light.

We quote warehouse prices Buffalo as follows: Structural shapes, 3.65c.; plates, 3.65c.; soft steel bars, 3.55c.; hoops, 4.65c.; bands, 4.35c.; blue annealed sheets, No. 10 gage, 4.30c.; galvanized steel sheets, No. 28 gage, 6.10c.; black sheets, No. 28 gage, 5c.; cold rolled round shafting, 4.45c.

**Old Material.**—The market continues very strong with business fairly brisk. Sales of heavy melting steel have been made at \$20.50, Buffalo, and a mill which recently bought a heavy tonnage of heavy melting steel is reported to be in the market for more material. This mill was recently in receipt of heavy steel orders and has swung into full operation. Some inquiries have come in for car wheels, malleable, etc., and a West Virginia furnace is paying \$18 delivered for blast furnace borings and turnings. One large Buffalo mill which has recently increased its operations by four open-hearth furnaces has not taken any active part in the buying of old material lately, and its policy in this regard is being awaited with interest. Business from outside continues to interest local dealers and heavy shipments of heavy melting steel, hydraulic compressed, etc., are being made to eastern Pennsylvania and Valley points. The general situation is showing improvement and dealers feel that the market is in for a considerable run of good business.

We quote f.o.b., gross ton, Buffalo, as follows:

Heavy melting steel.....	\$20.50 to \$21.00
Low phos., 0.04 and under.....	24.00 to 25.00
No. 1 railroad wrought.....	18.00 to 19.00
Car wheels.....	20.50 to 21.00
Machine shop turnings.....	14.00 to 14.50
Cast iron borings.....	14.50 to 15.00
No. 1 busheling.....	18.50 to 19.00
Stove plate.....	18.00 to 18.50
Grate bars.....	17.50 to 18.00
Bundled sheet stampings.....	13.00 to 13.50
Hydraulic compressed.....	17.00 to 18.25
Railroad malleable.....	22.00 to 23.00
No. 1 machinery cast.....	20.00 to 20.50

## Birmingham

### Buying of Pig Iron to a Large Extent by Southern Melters

BIRMINGHAM, ALA., Feb. 4.—With quotations on a \$23 per ton base, No. 2 foundry, Southern furnace interests are making but little effort to book business for second quarter delivery. The tonnage already disposed of for April-June delivery is beginning to mount. The lower price, \$22.50, has been withdrawn by all furnaces and the small lot purchaser is paying the base price for iron. Deliveries on old and new contracts are steady, the probable make being absorbed with some of the surplus iron being taken from the yards. The greater amount of the pig iron sold recently will go to Southern consumers. Inquiries have been received from the Middle West again, from Illinois and Ohio territories. While optimism is expressed, there are some who do not look for another advance in price for a while, though one or two quotations recently have been around \$23.50 per ton. Production in Alabama for the first month shows a little increase in comparison with that of December. Two furnaces are being repaired in this district now and a third could be placed in condition in one week, but none will be blown in until there is warrant for a greater production of pig iron. The surplus stock will take care of extra business for a while. Some improvement is noted in the demand for charcoal iron.

We quote per gross ton f.o.b. Birmingham district furnace as follows:

Foundry, silicon, 1.75 to 2.25.....	\$23.00
Basic.....	23.00
Charcoal, warm blast.....	33.00

**Cast Iron Pipe.**—Cast iron pipe of all sizes, pressure and sanitary, is active and shipments equal to the make. Very little pressure pipe is on the yards and sales are being made every week, the winter buying being up to expectations, with probabilities now strong for capacity operation of plants through the first eight months of the year. Lettings for pressure pipe recently received in Birmingham include those announced by the American Cast Iron Pipe Co., Sheboygan, Wis., 701 tons; San Francisco, Cal., 925 tons; North College Hill, Ohio, 333 tons; St. Paul, Minn., 537 tons. The United States Cast Iron Pipe & Foundry Co. and the National Cast Iron Pipe Co. both got their share of business and there is active movement of this class of pipe by both rail and water, where the latter is possible, such as California and Northwestern points. Sanitary pipe and fittings business is picking up. The Birmingham Machine & Foundry Co. is adding to its two pipe shops and will increase its production shortly. Pipe shops in Anniston, Gadsden, North Birmingham and Bessemer are also increasing production, with prospects of the conditions continuing.

We quote: 4-in. water, \$51; 6-in., \$47; larger sizes, \$46; 4-in. gas, \$56; 6-in., \$52; standard sanitary pipe, \$55; heavy gage, \$45.

**Coke.**—While coke quotations are somewhat stronger than they have been, ranging from \$5.50 to \$6.50 per ton for by-product foundry coke, the market is not considered any better than it has been for the past few weeks. Production is being maintained, though it is considerably less than it was several months ago.

**Old Material.**—The scrap iron and steel market of the Birmingham district shows further improvement, though the readjustment is slow. No. 1 cast is still being purchased by pipe makers and with iron assuming stronger position in quotations more old material will be required. Stove plate is being purchased still by the brake shoe company. Heavy melting steel sells at \$14 to \$15 base because the larger purchaser on the open market buys according to its own needs and practically fixes price. Car wheels are being cut up to be used as a special steel scrap. No. 1 cast is around \$19.50 to \$20 per ton, while stove plate sells at \$16.50 to \$17. All old material yards in the Birmingham district are well stocked.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Cast iron borings, chemical.....	\$16.00
Heavy melting steel.....	\$14.00 to 15.00
Railroad wrought.....	12.00 to 13.00
Steel axles.....	19.00 to 20.00
Iron axles.....	20.00
Steel rails.....	12.00 to 13.00
No. 1 cast.....	19.50 to 20.00
Tram car wheels.....	18.00 to 19.00
Car wheels.....	13.00 to 14.00
Stove plate.....	16.50 to 17.00
Machine shop turnings.....	7.00 to 9.00
Cast iron borings.....	9.00 to 10.00

## Cincinnati

### Pig Iron Market Fairly Active—Tennessee Grades Sold at \$22.50 Base

CINCINNATI, Feb. 5.—The pig iron market was fairly active last week, and the aggregate of sales in this district was well over 10,000 tons. An Indiana malleable consumer bought 2000 tons of Valley iron, while another Indiana melter bought 1500 tons of Buffalo iron. An Indiana stove maker took 1500 tons of Chicago iron at less than \$24, Chicago. A central Ohio melter bought 500 tons of foundry from a southern Ohio furnace at \$24, Ironton, and another melter took 500 tons of malleable at the same price. Furnaces in southern Ohio are now considering an advance to \$24.50 on foundry and malleable grades. Southern iron is now being held at \$23 for second quarter, but \$22.50 can be done on Tennessee irons for first quarter. Some Southern producers have withdrawn entirely from the market. We note a sale of 1200 tons of Southern iron, to a radiator company, at \$23, and another to a southern Ohio melter of 500 tons at \$22.50 for first quarter. Following the advance of \$1 in silveries, demand has been light, although early in the week some round lots

were sold. There is little activity in Bessemer. Basic also is inactive, although a recent sale of 15,000 tons to an Ohio River melter is now reported. A second Martin furnace at Ironton will be blown in about Feb. 10. Inquiries totaling 7000 tons of foundry and malleable, for second quarter, are being figured on.

Based on freight rates of \$4.05 from Birmingham and \$2.27 from Ironton we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)....	\$26.55
Southern coke, sil. 2.25 to 2.75 (No. 2 soft) ..	27.05
Ohio silvery, 8 per cent.....	35.77
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2) .....	26.27
Basic Northern .....	25.77
Malleable .....	25.27

**Sheets.**—Orders continue to be placed in fair volume, and prices are being maintained. There has been little deviation from established quotations of 3c. for blue annealed, 3.85c. for black and 5c. for galvanized. Automobile sheets are strong at 5.35c.

**Reinforcing Bars.**—Demand has been good for small tonnages, but the only large one reported is for a brass finishing building for the Standard Sanitary Mfg. Co., Louisville, Ky., which will require about 500 tons. Road work in Ohio, scheduled for awards Feb. 12 will take approximately 800 tons of bars. Prices are being maintained at 2.20c. to 2.40c. mill, for rerolled and new steel respectively.

**Structural Steel.**—No large jobs came out during the week, but a number of small ones are on inquiry. Lettings were light, several projects scheduled for awards having been postponed until next week.

**Finished Materials.**—A noticeable improvement in the demand for bars was reported last week, with some companies reporting orders more numerous than for any week since September last. Plates are also moving in fair volume, though most of the orders are for small tonnages. There is a feeling among the trade that a price of 2.40c. on plates can be done, and consumers are refraining from placing large orders until the price situation clears. Plate users are getting more business, particularly among the larger manufacturers of tanks. Structural shapes are in better demand, particularly for stock. Prices are steady. Wire products are moving fairly well, and the L. & N. Railroad is in the market for 2300 kegs of wire nails. Manufacturers' wires are good sellers, and while there is some talk of some classes of wire being shaded in price, regular schedules are being pretty well adhered to. Track accessories and light rails are in fair demand. Bolts and nuts are steady, a recent railroad order calling for 1,000,000 bolts.

**Warehouse Business.**—Jobbers report demand during the week rather light, but in this territory this is usually the case at the beginning of a new month. Prices are being firmly maintained.

Cincinnati jobbers quote: Iron and steel bars, 3.50c.; reinforcing bars, 3.60c.; hoops, 4.55c.; bands, 4.25c.; shapes, 3.60c.; plates, 3.60c.; cold-rolled rounds, 4.25c.; cold-rolled flats, squares and hexagons, 4.75c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, 4.80c.; No. 28 galvanized sheets, 5.85c.; No. 9 annealed wire, \$3.60 per 100 lb.; common wire nails, \$3.50 per keg base; cement coated nails, \$3.30 per keg.

**Coke.**—Foundry coke has been in fair demand, but domestic and furnace grades are quiet, and ovens are in need of orders. Connellsville coke quotations are firmer, but Wise County prices are off at least 25c. No changes are reported in New River or by-product fuels. Operators are declining to consider the making of contracts extending after April 1.

Connellsville furnace, \$4; foundry, \$5; New River foundry, \$10 to \$11; Wise County furnace, \$4.50; foundry, \$5.50; by-product foundry, \$8, Connellsville basis.

**Old Material.**—The demand has been fairly good from this district, principally for foundry grades. Most of the material is being shipped to Cleveland and Valley points, however, where higher prices are being paid by consumers. Prices generally are about the same as last week.

We quote dealers' buying prices, f.o.b. cars, Cincinnati:

Per Gross Ton	
Heavy melting steel.....	\$18.00 to \$18.50
Miscellaneous rails .....	17.00 to 17.50
Short rails .....	21.50 to 22.00
Relaying rails .....	31.00 to 31.50
Rails for rolling.....	18.50 to 19.00
Old car wheels.....	16.00 to 16.50
No. 1 locomotive tires.....	18.00 to 18.50
Railroad malleable .....	19.00 to 19.50
Agricultural malleable .....	18.00 to 18.50
Loose sheet clippings.....	13.00 to 13.50
Champion bundled sheets.....	13.50 to 14.00
Per Net Ton	
Cast iron borings.....	12.50 to 13.00
Machine shop turnings.....	11.50 to 12.00
No. 1 machinery cast.....	21.50 to 22.00
No. 1 railroad cast.....	18.00 to 18.50
Iron axles .....	24.00 to 24.50
No. 1 railroad wrought.....	13.50 to 14.00
Pipes and flues.....	11.00 to 11.50
No. 1 busheling.....	12.50 to 13.00
Mixed busheling .....	10.50 to 11.00
Burnt cast .....	13.50 to 14.00
Stove plate .....	14.00 to 14.50
Brake shoes .....	14.50 to 15.00

## Boston

### Eastern Pennsylvania and Buffalo Pig Iron Prices Being Shaded

BOSTON, Feb. 5.—While firmer prices are noted in other sections of the country, eastern Pennsylvania pig iron is offered at price concessions in New England and Buffalo furnace interests are endeavoring to meet such competition, while delivered Buffalo iron prices are shaded by makers of New York iron. In addition, silicon differentials are waived even on unimportant tonnages. Open inquiries on round tonnages are few and far between, consequently current business is mostly a matter of solicitation and involves small individual tonnages, aggregating about 2500 to 3000 tons weekly. Details regarding solicited business usually are lacking until a time when they have little news value. A Providence, R. I., foundry is reported to have purchased several hundred tons of eastern Pennsylvania No. 2X at \$26.15 delivered or \$22.50 furnace, while offers to shade \$22.50 furnace have been made on No. 2 plain. Buffalo furnaces heretofore on a \$23 furnace base have offered No. 2 plain at \$22 furnace or \$26.91 delivered, while a New York furnace offered to take the business at \$26.15 delivered. Western Pennsylvania, Virginia and Alabama furnaces are standing pat on prices. The Crompton & Knowles Loom Works, Worcester, Mass., this week will close on 500 to 1000 tons No. 2 plain and possibly more. The New England foundry industry's ratio of production has not increased.

We quote delivered prices on the basis of the latest reported sales as follows, having added \$3.65 freight from eastern Pennsylvania, \$4.91 from Buffalo, \$5.92 from Virginia, and \$9.60 from Alabama:

East. Penn. sil. 2.25 to 2.75.....	\$26.65 to \$27.15
East. Penn., sil. 1.75 to 2.25.....	26.15 to 26.65
Buffalo, sil. 2.25 to 2.75.....	27.41 to 28.41
Buffalo, sil. 1.75 to 2.25.....	26.91 to 27.91
Virginia, sil. 2.25 to 2.75.....	30.42 to 32.42
Virginia, sil. 1.75 to 2.25.....	29.92 to 31.92
Alabama, sil. 2.25 to 2.75.....	32.60
Alabama, sil. 1.75 to 2.25.....	32.10

**Coke.**—Both the New England Coal & Coke Co. and the Providence Gas Co. are quoting \$12.50 delivered on by-product foundry coke, February specifications on contracts. That price has been in vogue since October last, and compares with \$16 delivered for February, 1923. The movement of coke from ovens to foundries is light, most iron melters having a sufficient supply on hand to carry them through this month at least, and some through the first quarter. Crushed coke surplus stocks are still large, due to the open winter and to large stocks of unsold anthracite coal in retail dealers' yards. The New England Coal & Coke Co. offers crushed coke at \$8.50 a ton to consumers outside the \$2 freight rate zone and at \$10.50 to consumers inside the zone.

**Old Material.**—Activity in heavy melting steel has subsided, orders against shipments to eastern Pennsylvania and Pittsburgh district mills having been filled. Offerings by New England holders have increased now the demand is less, and prices are barely steady. Re-

jections by a recent Steubenville buyer help to unsettle the market. Cast iron borings likewise are offered more freely with a lesser demand. Much of the recent buying was against shipments to the Tremont Nail Co., Wareham, Mass. Steel turnings are not in much demand. Buying of pipe for Milton and Lebanon, Pa., delivery is active and the market about \$1.50 a ton higher. Stove plate also is active at around \$13 on cars, several thousand tons having been purchased by a Norwood, Mass., railroad equipment maker. Offerings are surprisingly large. New England foundries have practically stopped buying machinery cast and prices are easier.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast.....	\$22.00 to \$22.50
No. 2 machinery cast.....	20.00 to 20.50
Stove plates.....	16.00 to 16.50
Railroad malleable.....	18.00 to 18.50

The following prices are offered per gross ton lots, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$14.50 to \$15.00
No. 1 railroad wrought.....	14.50 to 15.00
No. 1 yard wrought.....	12.50 to 13.00
Wrought pipe (1-in. in diam., over 2 ft. long).....	13.50 to 13.75
Machine shop turnings.....	11.00 to 11.50
Cast iron borings, chemical.....	12.00 to 12.50
Cast iron borings, rolling mill.....	11.00 to 11.50
Blast furnace borings and turnings.....	11.00 to 11.50
Forged scrap and bundled skeleton.....	10.75 to 11.25
Shafting.....	17.50 to 18.00
Street car axles.....	17.50 to 18.00
Rails for rolling.....	15.00 to 15.50

## Philadelphia

### Sudden Spurt in Pig Iron Results in Orders Totalling 40,000 to 50,000 Tons

PHILADELPHIA, Feb. 5.—A sudden burst of activity in pig iron setting in the middle of last week brought out orders up to today totalling 40,000 to 50,000 tons from consumers in the Philadelphia and New York districts, with close to that much more tonnage still pending. There was one purchase on Monday of 20,000 tons of foundry iron, and a number of other large tonnages are pending, including one of 10,000 tons or more of basic and one of 4000 tons of foundry iron.

Steel business shows a consistent gain. Plates, which have been laggard, are now being produced at about a 50 per cent rate, while steel mills other than those rolling plates are up to 75 per cent or better.

There has been further selling of heavy melting steel scrap at \$19 and \$20, delivered.

**Pig Iron.**—Pig iron demand sprang up suddenly on Wednesday and Thursday of last week, following weeks of restricted buying. Inquiries came from many consumers and up to today fully 40,000 to 50,000 tons, mostly foundry iron, had been bought by consumers in the Philadelphia and New York districts. The renewal of buying may be explained possibly by the comparatively low prices for eastern Pennsylvania iron, this market having shown weakness recently, whereas other markets have been gaining strength. The largest purchase was closed Monday by a New Jersey cast iron pipe company, which took a total of 20,000 tons from several furnaces. There were numerous other sales, ranging from lots of 500 tons to 2000 or 3000 tons each, and a good deal of tonnage is still pending. Purchases of basic a week or so ago by one Eastern steel plant totaled several thousand tons more than had been generally supposed, and more basic inquiry from other sources is now being figured on. One prospective buyer may take 10,000 to 15,000 tons. Some of the iron purchased within the past few days was for the remainder of first quarter, but the bulk of it will be shipped in second quarter. The total of pending inquiries, including basic, may reach 30,000 tons or more, of which the largest single inquiry for foundry iron is for 4000 tons from a Trenton, N. J., melter. Prices have suffered slightly in the transactions of the past week. Foundry iron has been sold at prices ranging from \$22 to \$22.50, furnace, for No. 2 plain, while the most recent basic sale was at \$22.50, delivered. Theoretically, prices have strengthened by the putting of additional tonnage on furnace books, but actually it is difficult to make sales,

except possibly carload lots, at more than \$22.50, furnace, for the base grade. A few sales of foreign iron are said to have been made direct to consumers. One cargo of Scotch iron is said to be afloat. An advance of \$2 or \$3 a ton in eastern Pennsylvania prices would undoubtedly let in considerable foreign iron, and this fact is used as an argument that prices for this district will not advance to that extent within the near future. Low phosphorus iron from abroad is being freely offered at \$27, f.o.b. cars Philadelphia, and at least one Eastern maker of copper-bearing iron will meet this competition when necessary. Demand for Virginia iron is moderate, the largest sale being a few thousand tons to a pipe company in that State.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76 cents to \$1.63 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$23.13 to \$24.13
East. Pa. No. 2X, 2.25 to 2.75 sil.	23.63 to 24.63
East. Pa. No. 1X.....	24.13 to 25.13
Virginia No. 2 plain, 1.75 to 2.25 sil.	29.17 to 30.17
Virginia No. 2X, 2.25 to 2.75 sil.	30.17 to 30.67
Basic delivery eastern Pa.....	22.50 to 23.00
Gray forge.....	22.50 to 23.00
Malleable.....	23.75 to 24.25
Standard low phos. (f.o.b. furnace).....	27.00 to 27.50
Copper bearing low phos. (f.o.b. furnace).....	28.00

**Ferroalloys.**—Both domestic and British ferromanganese is now freely quoted at \$107.50, seaboard or furnace.

**Semi-Finished Steel.**—There are no developments of importance in billets. Prices are unchanged at \$40, Pittsburgh, for rerolling quality and at \$45 for forging quality.

**Plates.**—A slow but steady increase in the demand for plates has brought Eastern plate mill operations up to about 50 per cent. Prices are slightly weaker, however, it now being easy to place orders at 2.35c., Pittsburgh, for lots of fair size, while on more attractive business 2.30c., Pittsburgh, has been quoted in a number of instances. The top of the market is 2.40c. The Norfolk & Western Railroad, which recently inquired for 4000 freight cars, has also inquired of steel companies for the steel, about 30,000 tons of plates and 15,000 tons of bars, channels, angles and zees, there being a possibility that the cars may be built in the railroad's own shops. An Eastern steel company has quoted on several thousand tons of plates for two Munson Line boats to be built on the Pacific Coast.

**Structural Material.**—Building work in the Philadelphia district is showing a little more activity, but mills which draw their trade from various districts report that other districts are more active than this. Two jobs in the markets are 1000 tons for an addition to the plant of the Atwater Kent Mfg. Co. and 300 tons for a Seamen's Institute. Usual quotations of Eastern mills are 2.40c., Pittsburgh, but occasional quotations of 2.35c., Pittsburgh, are being made.

**Bars.**—The larger producers of steel bars quote 2.40c., Pittsburgh, but 2.35c. is not unusual when the tonnage is attractive. Bar iron is quoted by Eastern mills from 2.25c. to 2.30c., Pittsburgh.

**Sheets.**—Concessions of \$2 a ton on black and galvanized sheets have reappeared, but most of the larger producers are holding for the full prices, 3.85c. and 5c., respectively. A better demand for blue annealed sheets in the past week is reported by a leading Eastern maker.

**Warehouse Business.**—Buying of steel out of stock is of fair proportions. Prices are unchanged, for local delivery being as follows:

Soft steel bars and small shapes, 3.47c.; iron bars (except bands), 3.47c.; round edge iron, 3.75c.; round edge steel, iron finished, 1½ x ¼ in., 3.75c.; round edge steel planished, 4.55c.; tank steel plates, ¼ in. and heavier, 3.57c.; tank steel plates, ¾ in., 3.82c.; blue annealed steel sheets, No. 10 gage, 4.10c.; black sheets, No. 28 gage, 5.15c.; galvanized sheets, No. 28 gage, 6.25c.; square twisted and deformed steel bars, 3.57c.; structural shapes, 3.57c.; diamond pattern plates, ¼ in., 5.40c.; ¾ in., 5.60c.; spring steel, 5c.; round cold-rolled steel, 4.35c.; squares and hexagons, cold-rolled steel, 4.85c.; steel hoops, 1 in. and wider, No. 20 gage and heavier, 4.27c.; narrower than 1 in., all gages, 4.77c.; steel bands, No. 12 gage to ¾ in., inclusive, 4.27c.; rails, 3.47c.; tool steel, 8.50c.; Norway iron, 7c.

**Coke.**—A leading beehive coke interest has quoted blast furnace coke to furnaces in this district at \$4.75, ceteris, for second quarter, but no contracts have been closed on that basis as there are indications that the furnaces may not need to go that high. Coke has been sold for the remainder of first quarter at \$4.40, and it is believed by consumers that second quarter contracts will be available at \$4.50.

**Old Material.**—Upward of 20,000 tons of No. 1 heavy melting steel has been sold to Eastern plants within the past few days, the price paid for a large proportion being \$19, delivered, while a small tonnage was sold at \$20. The market is fairly strong, but temporarily at least seems to have reached a halting place. Those who expected the recent advances to continue probably counted somewhat upon weather conditions, which this winter have been unusually favorable for the shipment of scrap. When snow and ice interfere with the movement of cars, as is nearly always the case in New England and New York State for at least a few weeks of each winter, this slowing down of scrap transportation puts prices up. So far this winter there has been practically no railroad difficulty and scrap has been coming out more freely than it is expected to at this season of year. A fresh demand for turnings for steel works use has advanced prices on that grade about 50c. a ton. Stove plate is slightly easier and blast furnace turnings are off a half dollar. Cast borings, however, are firmer at \$16.50 to \$17, the latter being merely an asking price.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel.....	\$19.00 to \$20.00
Scrap rails .....	19.00 to 20.00
Steel rails for rolling.....	22.00 to 23.00
No. 1 low phos., heavy 0.04 and under .....	24.00 to 25.00
Couplers and knuckles .....	24.00 to 25.00
Cast-iron car wheels .....	21.00 to 22.00
Roller steel wheels.....	24.00 to 25.00
No. 1 railroad wrought.....	22.00 to 23.00
No. 1 yard wrought.....	21.00 to 21.50
No. 1 forge fire .....	16.50 to 17.00
Bundled sheets (for steel works) .....	16.50 to 17.00
Mixed boring and turnings (for blast furnace use).....	15.50 to 16.50
Machine shop turnings (for steel works use) .....	16.50 to 17.00
Machine shop turnings (for rolling mill use).....	16.50 to 17.00
Heavy axle turnings (or equivalent) .....	17.00 to 18.00
Cast borings (for steel works and rolling mills).....	16.50 to 17.00
Cast borings (for chemical plants) .....	18.00 to 18.50
No. 1 cast .....	21.00 to 22.00
Heavy breakable cast (for steel plants) .....	18.50 to 19.00
Railroad grate bars .....	18.00 to 18.50
Stove plate (for steel plant use) .....	17.50 to 18.00
Railroad malleable .....	18.50 to 19.00
Wrought iron and soft steel pipes and tubes (new specifications) .....	19.00 to 20.00
Shafting .....	25.00 to 26.00
Steel axles .....	25.00 to 26.00

### Pig Iron and Old Material More Active at Detroit

DETROIT, Feb. 5.—While there has been no general buying movement, some interest is being shown by melters in their second quarter requirements for pig iron. The high levels established in the market on old materials has also brought out some additional tonnage on first quarter iron. The melt is increasing slightly due to a pick-up in the malleable shops which have been running not over 50 per cent for the last 60 days. Scrap prices are unchanged.

The following prices are quoted on a gross ton basis f.o.b. cars producers' yards, excepting stove plate, No. 1 machinery cast and automobile cast, which are quoted on a net ton basis:

Heavy melting steel.....	\$16.75 to \$17.25
Shoveling steel .....	16.75 to 17.25
Borings .....	13.00 to 13.50
Short turnings .....	13.00 to 13.50
Long turnings .....	12.00 to 12.50
No. 1 machinery cast.....	18.00 to 19.00
Automobile cast .....	24.00 to 26.00
Hydraulic compressed .....	14.50 to 15.00
Stove plate .....	16.50 to 17.50
No. 1 busheling.....	12.50 to 13.00
Sheet clippings .....	11.50 to 12.00
Flashings .....	12.50 to 13.00

## Cleveland

### Satisfactory Demand for Steel—Moderate Activity in Pig Iron

CLEVELAND, Feb. 5.—Mills continue to book a good volume of business. Orders, as a rule, are not large, but consumers generally are buying in larger quantities than they were recently, although there is not a general disposition to carry much material in stock. Some of the automobile companies are not making extended commitment, and in some cases have placed orders on which they wanted quicker deliveries than mills are able to make. One producer booked more business in January than in any other month since last April. Deliveries are getting a little slower, and some mills are now making shipments in five to six weeks in bars and structural material, but can make quicker deliveries on plates. The volume of plate business is fair, but the 2.40c. price is still common. Some round tonnages have been placed with Youngstown mills by Valley tank shops that have taken 4500 tons of plates for Standard Oil Co. tanks. The demand for light plates from automobile manufacturers continues strong. In the structural field, local inquiry is light. The Mt. Vernon Bridge Co. has taken 5000 tons for train sheds for the Chicago Union Station. Two inquiries have come from the West for bridge and building work requiring 10,000 tons. Hot-rolled strip steel now appears fairly firm at 3c. for narrow strip, but some mills need additional orders and concessions to from 2.75c. to 2.80c. on wide strip are still being made. The only inquiry in the railroad field is from the Nickle Plate Railroad for 675,000 tie plates.

**Pig Iron.**—A moderately active buying movement for the second quarter has set in and prices on foundry and malleable iron are fairly well established at \$24 for that delivery in the northern and southern Ohio and Michigan territories. In the Valley district, foundry iron is still available at \$23.50 for the first quarter, but it is doubtful whether that price would be quoted for more extended delivery. While one interest reports sales from Buffalo at \$23 Buffalo iron is still being offered freely at \$22.50 and an inquiry that is pending in Erie, Pa., for 1000 tons brought out that price from Buffalo. With the advance in Ohio prices, Buffalo furnaces are showing more activity in sales efforts in this territory. For Cleveland delivery local furnaces quote foundry and malleable iron at \$24 and while one seller has been naming \$23.50 for outside shipment, that price has about disappeared. One Ohio producer who temporarily withdrew from the market has resumed taking second quarter contracts, having advanced its price to \$24. We note the sale of 1000 tons of foundry iron to a northern Ohio consumer and 300 tons to a Mansfield consumer, both at \$24. Sales of several other 1000-ton lots are reported. While considerable of the demand is from the automotive industry, buying is well scattered among sanitary, heating equipment and other consuming interests. Among pending inquiries is one for 6000 tons and one for 3000 tons of foundry and malleable iron. Basic iron is pretty well established at \$22.50 to \$23 Valley furnace and it is possible that the higher price would not now be shaded. Two Cleveland interests quoted \$24 on the 40,000 ton inquiry from the National Tube Co. Southern foundry iron is quiet and firm at \$23. We note the sale of two 200-ton lots of Tennessee iron at that price. Prices on Ohio silvery iron have been advanced \$1 a ton.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron include a 50c. switching charge. Ohio silvery and Southern iron prices are based on a \$3.02 freight rate from Jackson and \$6 rate from Birmingham:

Basic, Valley furnace.....	\$22.50 to \$23.00
Northern No. 2 fdy., sil. 1.75 to 2.25 .....	24.50
Southern fdy., sil. 1.75 to 2.25.....	29.00
Malleable .....	24.50
Ohio silvery, 8 per cent.....	36.52
Standard low phos., Valley furnace .....	29.00 to 30.00

(Continued on page 482)

# Prices Finished Iron and Steel f.o.b. Pittsburgh

Carload Lots

## Plates

Sheared, tank quality, base, per lb.....2.50c.

## Structural Materials

Beams, channels, etc., base, per lb.....2.50c.  
Sheet piling.....2.65c.

## Iron and Steel Bars

Soft steel bars, base, per lb.....2.40c.  
Soft steel bars for cold finishing.....\$3 per ton over base  
Reinforcing steel bars, base.....2.40c.  
Refined iron bars, base, per lb.....3.10c. to 3.15c.  
Double refined iron bars, base, per lb.....4.75c.  
Stay bolt iron bars, base, per lb.....7.75c. to 8c.

## Hot-Rolled Flats

Hoops, base, per lb.....3c.  
Bands, base, per lb.....3c.  
Strips, base, per lb.....3c.

## Cold-Finished Steel

Bars and shafting, base, per lb.....3c.  
Bars, S. A. E. Series, No. 2100.....4.75c.  
Bars, S. A. E. Series, No. 2300.....6.25c. to 6.50c.  
Bars, S. A. E. Series, No. 3100.....5.25c. to 5.50c.  
Strips, base, per lb.....4.75c. to 5.00c.

## Wire Products

(To jobbers in car lots)

Nails, base, per keg.....\$3.00  
Galvanized nails, 1 in. and over.....\$2.25 over base  
Galvanized nails, less than 1 in.....2.50 over base  
Bright plain wire, base, No. 9 gage, per 100 lb.....\$2.75  
Annealed fence wire, base, per 100 lb.....2.90  
Spring wire, base, per 100 lb.....3.70  
Galvanized wire No. 9, base, per 100 lb.....3.35  
Galvanized barbed, base, per 100.....3.80  
Galvanized staples, base, per keg.....3.80  
Painted barbed wire, base, per 100 lb.....3.45  
Polished staples, base, per keg.....3.45  
Cement coated nails, base, per count keg.....\$2.60 to 2.70  
Bale ties, carloads to jobbers.....75 and 2 1/2 per cent off list  
Woven fence, carloads (to jobbers).....67 1/2 per cent off list  
Woven fence, carloads (to retailers).....65 per cent off list

## Bolts and Nuts

Machine bolts, small, rolled threads.....60, 10 and 5 per cent off list  
Machine bolts, all sizes, cut threads.....60 and 5 per cent off list  
Carriage bolts, 3/4 x 6 in.:  
Smaller and shorter, rolled threads.....60 and 5 per cent off list  
Carriage bolts, cut threads, all sizes.....50, 10 and 5 per cent off list  
Lag bolts.....65 and 5 per cent off list  
Plow bolts, Nos. 1, 2 and 3 heads.....50 and 10 per cent off list  
Other style heads.....20 per cent extra  
Machine bolts, c.p.c. and t. nuts, 3/4 x 4 in.:  
50 and 5 per cent off list  
Larger and longer sizes.....50 and 5 per cent off list  
Hot pressed squares or hex. nuts, blank.....4.25c. off list  
Hot pressed nuts, tapped.....4.25c. off list  
C.p.c. and t. square or hex. nuts, blank.....4c. off list  
C.p.c. and t. square or hex. nuts, tapped.....4c. off list  
Semi-finished hex. nuts:  
1/2 in. and smaller, U. S. S.....80 and 5 per cent off list  
3/4 in. and larger, U. S. S.....75 and 5 per cent off list  
Small sizes, S. A. E.....80, 10 and 5 per cent off list  
S. A. E., 3/4 in. and larger.....75, 10 and 5 per cent off list  
Stove bolts in packages.....75, 10 and 5 per cent off list  
Stove bolts in bulk.....75, 10, 5 and 2 1/2 per cent off list  
Tire bolts.....60 and 10 per cent off list  
Bolt ends with hot pressed nuts.....60 and 5 per cent off list  
Bolt ends with cold pressed nuts.....50 and 5 per cent off list  
Turnbuckles, with ends, 1/2 in. and smaller,  
50 to 55 and 5 per cent off list  
Turnbuckles, without ends, 1/2 in. and smaller,  
65 and 5 to 70 and 10 per cent off list  
Washers.....5c. to 5.25c. off list

## Semi-Finished Castellated and Slotted Nuts

(To jobbers and consumers in large quantities f.o.b. Pittsburgh.)

	Per 1000	Per 1000		Per 1000	Per 1000
	S. A. E.	U. S. S.		S. A. E.	U. S. S.
1/4-in.	\$4.80	\$4.80	3/4-in.	\$15.00	\$15.00
3/8-in.	5.50	6.00	1-in.	19.50	20.00
1/2-in.	6.50	7.00	3/4-in.	28.50	28.50
5/8-in.	9.00	9.50	1-in.	37.00	37.50
3/4-in.	11.00	11.50	1-in.	58.50	60.50

Larger sizes—Prices on application.

## Cap and Set Screws

Milled hex. head cap screws.....75, 10 and 5 per cent off list  
Milled standard set screws, case hardened.....75, 10 and 5 per cent off list  
Milled headless set screws, cut thread.....75, 10 and 5 per cent off list  
Upset hex. head cap screws, U. S. S. thread.....80, 10 and 10 per cent off list  
Upset hex. head cap screws, S. A. E. thread.....80, 10 and 10 per cent off list  
Milled studs.....65 and 10 per cent off list

## Rivets

Large structural and ship rivets, base, carloads, per 100 lb.....\$2.75  
Large structural and ship rivets, less carloads.....2.90  
Small rivets, carloads.....70 and 10 per cent off list  
Small rivets, less carloads.....65 and 10 per cent off list

## Track Equipment

Spikes, 1/2 in. and larger, base, per 100 lb.....\$3.05 to \$3.15  
Spikes, 1/2 in., 3/4 in. and 1 in., per 100 lb.....3.25 to 3.50  
Spikes, 3/4 in.....3.25 to 3.50  
Spikes, boat and barge, base, per 100 lb.....3.25 to 3.50  
Track bolts, 3/4 in. and larger, base, per 100 lb.....4.00 to 4.25  
Track bolts 1/2 in. and 3/4 in., base, per 100 lb.....5.00 to 5.50  
Tie plates, per 100 lb.....2.60  
Angle bars, base, per 100 lb.....2.75

## Welded Pipe

Butt Weld			Iron		
Inches	Steel	Galv.	Inches	Black	Galv.
1/2	45	19 1/2	1/2 to 3/4	+11	+39
3/4 to 1	51	25 1/2	1/2	22	2
1 1/2	56	42 1/2	3/4	28	11
2	60	48 1/2	1 to 1 1/2	30	13
1 to 3	62	50 1/2			

## Lap Weld

2	55	43 1/2	2	23	7
2 1/2 to 6	59	47 1/2	2 1/2	26	11
7 and 8	56	43 1/2	3 to 6	28	13
9 and 10	54	41 1/2	7 to 12	26	11
11 and 12	53	40 1/2			

## Butt Weld, extra strong, plain ends

1/2	41	24 1/2	2 to 3	61	50 1/2
3/4 to 1	47	30 1/2	3/4 to 1	+19	+54
1 1/2	53	42 1/2	1 1/2	21	7
2	58	47 1/2	2	28	12
1 to 1 1/2	60	49 1/2	1 to 1 1/2	30	14

## Lap Weld, extra strong, plain ends

2	53	42	2	23	9
2 1/2 to 4	57	46 1/2	2 1/2 to 4	29	15
4 1/2 to 6	56	45 1/2	4 1/2 to 6	28	14
7 to 8	52	39 1/2	7 to 8	21	7
9 and 10	45	32 1/2	9 to 12	16	2
11 and 12	44	31 1/2			

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 per cent on black and 1 1/2 points, with a supplementary discount of 5 per cent on galvanized.

## Boiler Tubes

Lap Welded Steel	Charcoal Iron
2 to 2 1/4 in.....27	1 1/2 in.....+18
2 1/2 to 2 3/4 in.....37	1 3/4 to 1 1/2 in.....+8
3 in.....40	2 to 2 1/4 in.....2
3 1/4 to 3 3/4 in.....42 1/2	2 1/2 to 3 in.....7
4 to 13 in.....46	3 1/4 to 4 1/2 in.....9

Less carload lots 4 points less.

## Standard Commercial Seamless Boiler Tubes

Cold Drawn	Hot Rolled
1 in.....55	3 and 3 1/4 in.....36
1 1/4 and 1 1/2 in.....47	3 1/2 and 3 3/4 in.....37
1 3/4 in.....31	4 in.....41
2 and 2 1/4 in.....22	4 1/2 in. and 5 in.....33
2 1/2 and 2 3/4 in.....32	

Less carloads, 4 points less. Add \$8 per net ton for more than four gages heavier than standard. No extras for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tube list and discount. Intermediate sizes and gages not listed take price of net larger outside diameter and heavier gage.

## Seamless Mechanical Tubing

Carbon under 0.30, base.....\$3 per cent off list  
Carbon 0.30 to 0.40, base.....\$1 per cent off list  
Plus usual differentials and extras for cutting. Warehouse discounts range higher.

## Seamless Locomotive and Superheater Tubes

Cents per Ft.	Cents per Ft.
2-in. O.D. 12 gage.....15	2 1/4-in. O.D. 10 gage.....20
2-in. O.D. 11 gage.....16	3-in. O.D. 7 gage.....35
2-in. O.D. 10 gage.....17	1 1/2-in. O.D. 9 gage.....15
2 1/4-in. O.D. 12 gage.....17	5 1/2-in. O.D. 9 gage.....55
2 1/4-in. O.D. 11 gage.....18	5 1/2-in. O.D. 9 gage.....57

## Tin Plate

Standard cokes, per base box.....\$5.50

## Terne Plate

(Per Package, 20 x 28 in.)	
8-lb. coating, 100 lb base.....\$11.00	20-lb. coating I. C.....\$14.90
8-lb. coating I. C.....11.30	25-lb. coating I. C.....16.20
12-lb. coating I. C.....12.70	30-lb. coating I. C.....17.35
15-lb. coating I. C.....13.95	35-lb. coating I. C.....18.35
	40-lb. coating I. C.....19.35

## Sheets

**Blue Annealed**  
Nos. 9 and 10 (base), per lb.....3c.  
**Box Annealed, One Pass Cold Rolled**  
No. 28 (base), per lb.....3.85c.  
**Automobile Sheets**  
Regular auto body sheets, base (22 gage), per lb.....5.35c.  
No. 28 (base), per lb.....5c.  
**Long Ternes**  
No. 28 gage (base), 8-lb. coating, per lb.....5.30c.  
**Tin-Mill Black Plate**  
No. 28 (base), per lb.....3.85c.

# Prices of Raw Materials, Semi-Finished and Finished Products

## Ores

### Lake Superior Ores, Delivered Lower Lake Ports

Old range Bessemer, 55 per cent iron.....	\$6.45
Old range non-Bessemer, 51½ per cent iron.....	5.70
Mesabi Bessemer, 55 per cent iron.....	6.20
Mesabi non-Bessemer, 51½ per cent iron.....	5.55

### Foreign Ore, per Unit, c.i.f. Philadelphia or Baltimore

Iron ore, low phos., copper free, 55 to 58 per cent iron in dry Spanish or Algerian...	11.00c.
Iron ore, Swedish, average 66 per cent iron	9.50c.
Manganese ore, washed, 51 per cent manganese, from the Caucasus, nominal.....	46c.
Manganese ore, ordinary, 48 per cent manganese, from the Caucasus.....	43c.
Manganese ore, Brazilian or Indian, nominal	42c.
Tungsten ore, per unit, in 60 per cent concentrates.....	\$8.25 to \$10.00
Chrome ore, basic, 43 per cent Cr <sub>2</sub> O <sub>3</sub> , crude, per ton, c.i.f. Atlantic seaboard.....	18.00 to 28.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS <sub>2</sub> , New York.....	75c. to 85c.

## Ferroalloys

Ferromanganese, domestic, 80 per cent, furnace, or seaboard, per ton.....	\$107.50
Ferromanganese, British, 80 per cent, f.o.b. Atlantic port, duty paid.....	107.50
Ferrosilicon, 50 per cent, delivered.....	\$74.00 to 75.00
Ferrosilicon, 75 per cent.....	140.00
Ferrotungsten, per lb. contained metal.....	85c. to 90c.
Ferromanganese, 4 to 6 per cent carbon, 60 to 70 per cent Cr., per lb. contained Cr. delivered.....	10.75c.
Ferromanganese, 6 to 7 per cent carbon, 60 to 70 per cent Cr., per lb.....	10.50c.
Ferrovandium, per lb. contained vanadium	\$3.50 to \$4.00
Ferrocobaltitium, 15 to 18 per cent, per net ton.....	200.00

## Spiegeleisen, Bessemer Ferrosilicon and Silvery Iron

(Per gross ton furnace unless otherwise stated)

Spiegeleisen, domestic, 19 to 21 per cent.....	\$38.00 to \$40.00
Spiegeleisen, domestic, 16 to 19 per cent.....	37.00 to 38.00
Ferrosilicon, Bessemer, 10 per cent, \$42.50; 11 per cent, \$45; 12 per cent, \$47.50.	
Silvery iron, 5 per cent, \$30.00; 6 per cent, \$31.00; 7 per cent, \$32.00; 8 per cent, \$33.50; 9 per cent, \$35.50; 10 per cent, \$37.50; 11 per cent, \$40.00; 12 per cent, \$42.50.	

## Fluxes and Refractories

Fluorspar, 80 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines.....	\$22.00
Fluorspar, 85 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines.....	23.50
Per 1000 f.o.b. works:	
Fire Clay:	
Pennsylvania.....	\$42.00 to \$45.00
Maryland.....	47.00
Ohio.....	42.00 to 43.00
Kentucky.....	42.00 to 43.00
Illinois.....	37.00 to 42.00
Missouri.....	42.00 to 45.00
Ground fire clay, per net ton.....	6.00 to 7.00
Silica Brick:	
Pennsylvania.....	\$40.00 to 42.00
Chicago.....	49.00
Birmingham.....	50.00
Ground silica clay, per net ton.....	8.00
Magnesite Brick:	
Standard size, per net ton (f.o.b. Baltimore and Chester, Pa.).....	65.00
Grain magnesite, per net ton (f.o.b. Baltimore and Chester, Pa.).....	40.00
Chrome Brick:	
Standard size, per net ton.....	47.00

## Semi-Finished Steel, F.O.B. Pittsburgh or Youngstown, per gross ton

Rolling billets, 4-in. and over.....	\$40.00
Rolling billets, 2-in. and under.....	\$40.00 to 42.50
Forging billets, ordinary carbons.....	45.00
Sheet bars, Bessemer.....	42.50
Sheet bars, open-hearth.....	42.50
Slabs.....	40.00
Wire rods, common soft, base, No. 5 to ¾-in.....	51.00
Wire rods, common soft, coarser than ¾-in.....	\$2.50 over base
Wire rods, screw stock.....	\$5.00 per ton over base
Wire rods, carbon, 0.20 to 0.40.....	3.00 per ton over base
Wire rods, carbon 0.41 to 0.55.....	5.00 per ton over base
Wire rods, carbon 0.56 to 0.75.....	7.50 per ton over base
Wire rods, carbon over 0.75.....	10.00 per ton over base
Wire rods, acid.....	15.00 per ton over base
Skelp, grooved, per lb.....	2.35c.
Skelp, sheared, per lb.....	2.35c.
Skelp, universal, per lb.....	2.35c.

## Finished Iron and Steel, F.O.B. Mill

Rails, heavy, per gross ton.....	\$43.00
Rails light, new steel, base, lb.....	2c. to 2.15c.
Rails, light, rerolled, base, per lb.....	1.85c. to 2.00c.
Spikes, ½-in. and larger, base, per 100 lb.....	\$3.00 to \$3.15
Spikes, ½-in. and smaller, base, per 100 lb.....	3.15 to 3.50
Spikes, boat and barge, base, per 100 lb.....	3.25 to 3.50
Track bolts, ¾-in. and smaller, base, per 100 lb.....	4.00 to 4.25
Track bolts, ¾-in. and larger, base, per 100 lb.....	4.50 to 5.00
Tie plates, per 100 lb.....	2.60
Angle bars, per 100 lb.....	2.75
Bars, common iron, base, per lb., Chicago mill.....	2.40c.
Bars, common iron, Pittsburgh mill.....	2.40c.
Bars, rails, steel reinforcing, base, per lb.....	2.15c. to 2.25c.
Cold finished steel bars, base, Chicago per lb.....	3c.
Ground shafting, base, per lb.....	3.40c.
Cut nails, base, per keg.....	\$3.15 to \$3.25

## Alloy Steel

S.A.E. Series Numbers	Bars 100 lb.
2100* (½% Nickel, 10 to 20 per cent Carbon)...	\$3.50
2300 (3½% Nickel).....	\$5.00 to 5.25
2500 (5% Nickel).....	7.75 to 8.00
3100 (Nickel Chromium).....	4.00 to 4.25
3200 (Nickel Chromium).....	5.75 to 6.00
3300 (Nickel Chromium).....	8.00 to 8.25
3400 (Nickel Chromium).....	7.00 to 7.25
5100 (Chromium Steel).....	3.75
5200* (Chromium Steel).....	7.50 to 8.00
6100 (Chromium Vanadium bars).....	4.75 to 5.00
6100 (Chromium Vanadium spring steel).....	4.50 to 4.75
9250 (Silico Manganese spring steel).....	3.75 to 4.00
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chromium, 0.15 Vanadium).....	5.00 to 5.25
Chromium Molybdenum bars (0.80—1.10 Chromium, 0.25—0.40 Molybdenum).....	4.50 to 4.75
Chromium Molybdenum bars (0.50—0.70 Chromium, 0.15—0.25 Molybdenum).....	4.25 to 4.50
Chromium Molybdenum spring steel (1—1.25 Chromium, 0.30—0.50 Molybdenum).....	4.75 to 5.00

Above prices are for hot-rolled alloy steel bars, forging quality, per 100 lb., f.o.b. Pittsburgh. Billets 4 x 4 in. and larger are \$10 per gross ton less than net ton price for bars of same analyses. On smaller than 4 x 4-in. billets the net ton bar price applies.

\*Not S.A.E. specifications, but numbered by manufacturers to conform to S.A.E. system.

## Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, carload lots, 36,000 lb. minimum carload, per 100 lb.:

Philadelphia, domestic.....	\$0.32	Buffalo.....	\$0.265	St. Louis.....	\$0.43	*Pacific Coast.....	\$1.15
Philadelphia, export.....	0.235	Cleveland.....	0.215	Kansas City.....	0.735	*Pac. Coast, ship plates.....	1.20
Baltimore, domestic.....	0.31	Cleveland, Youngstown.....	0.19	Kansas City (pipe).....	0.705	Birmingham.....	0.58
Baltimore, export.....	0.225	Comb.....	0.29	St. Paul.....	0.60	Memphis.....	0.56
New York, domestic.....	0.34	Detroit.....	0.29	Omaha.....	0.735	Jacksonville, all rail.....	0.70
New York, export.....	0.255	Cincinnati.....	0.29	Omaha (pipe).....	0.705	Jacksonville, rail and water.....	0.415
Boston, domestic.....	0.365	Indianapolis.....	0.31	Denver.....	1.26	New Orleans.....	0.67
Boston, export.....	0.255	Chicago.....	0.34	†Denver (pipe).....	1.17		

\*Applies minimum carload 80,000 lb. †Minimum loading 46,000 lb.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 35c.; ship plates, 40c.; ingots and muck bars, structural steel, common wire products, including cut or wire nails, spikes, and wire hoops, 40c.; sheets and tin plates, 40c.; sheets No. 12 gage and lighter, 50c.; rods, 40c.; wire rope cables and strands, 45c.; wire fencing, netting and stretcher, 40c.; pipes not over 12 in. in diameter, 55c.; over 12 in. in diameter, 2½c. per in. or fraction thereof additional. All rates per 100 lb. in carload lots, minimum 36,000 lb.

## FABRICATED STEEL BUSINESS

### Week Up to That Preceding in Both Awards and Inquiries

Against awards of 25,200 tons a week ago, last week's bookings in fabricated steel amounted to 23,500 tons; and compared with inquiries of 21,000 tons two weeks ago, fresh inquiries last week called for 25,300 tons. Roughly one-half of both buying and inquiry was for private enterprises. Awards include:

The Macmillan Publishing Co. building, 1400 tons, awarded to Hedden Iron Construction Co., as announced in THE IRON AGE of Jan. 24, is to be built at Fifth Avenue and Twelfth Street instead of at 1 West Forty-seventh Street, as reported.

Four-Eighty-Six Fifth Avenue Corporation, office building at that address, New York, 1600 tons, to George A. Just Co.

Loft building, 8 to 10 West Thirty-seventh Street, New York, 250 tons, to Easton Structural Steel Co.

Cornell Union, Ithaca, N. Y., 400 tons, to Bancroft-Jones Co., Buffalo.

Bridgeport, Conn., highway spring span, 200 tons, to American Bridge Co.

Keeler Hotel, Albany, N. Y., 2400 tons, to A. E. Norton, Inc.

Hering loft building, Thirty-eighth Street, New York, 1200 tons, to Harris Structural Steel Co.

New York Telephone Co., exchange building, 400 tons, to Eidlitz & Ross.

Chicago Union Station Co., train sheds, 5000 tons, to Strobel Steel Construction Co., fabrication sublet to Mount Vernon Bridge Co.

Bridge, Pueblo, Colo., 2200 tons, divided between Mount Vernon Bridge Co. and Virginia Bridge & Iron Co.

Security Trust & Savings Bank building, Long Beach, Cal., 1367 tons, to Llewellyn Iron Works.

Garland building, Chicago, five-story addition, 610 tons, to Hansell-Elcock Co.

Mare Island Navy Yard, two 50,000 bbl. tanks, 500 tons, to Butte Electrical Equipment Co., fabrication sublet to Pacific Tank Co.

Terminal Railroad Association, St. Louis, repairs to Merchants' bridge, 577 tons, to American Bridge Co.

State Fair Grounds, Indianapolis, cattle barn, 700 tons, to Insley Mfg. Co.

Kohler Co., Kohler, Wis., foundry addition, 550 tons, new cleaning room, 200 tons, to Worden-Allen Co.

Wolverine Power Co., Beaverton, Mich., tainter gates, 200 tons, to Worden-Allen Co.

Spring Canyon Coal Co., Storrs, Utah, coal tipple, 350 tons, to Wisconsin Bridge & Iron Co.

Boston Store, distributing depot, Milwaukee, service addition, 100 tons to Lakeside Bridge & Steel Co.

Public School No. 197, New York, 950 tons, to Jones & Laughlin Steel Corporation.

Public School No. 33, New York, 950 tons, to Jones & Laughlin Steel Corporation.

Autocar Co., garage, Pittsburgh, 150 tons, to Jones & Laughlin Steel Corporation.

Two Ohio River type of ferry boats, approximately 750 tons, to Howard Shipbuilding Co.

U. S. Engineers' Office, Memphis, maneuver boat, 150 tons, to Howard Shipbuilding Co.

New London, Conn., gas holder, 500 tons, to Stacey Mfg. Co.

The Allegheny Steel Co., Pittsburgh, electric furnace building extension, 100 tons, to McClintic-Marshall Co.

Masonic Temple, Canton, Ohio, 735 tons, to Canton Bridge Co.

Stern & Mann store building, Canton, Ohio, 450 tons, to Canton Bridge Co.

### Structural Projects Pending

Inquiries for fabricated steel work include the following:

Boston & Albany station, Springfield, Mass., previously reported as requiring 800 tons, now estimated at 1200 tons.

Insurance Co. of North America, office building, Philadelphia, previously reported as requiring 6000 tons, now estimated at 7200 tons.

Public Service Corporation of New Jersey, addition to power plant at Kearny, N. J., 2000 tons.

Atlantic City, N. J., repairs to highway bridge, 400 tons.

Masonic Temple, St. Paul, 3000 tons.

Masonic Temple, St. Louis, 4500 tons.

Bell office building, Chicago, 1500 tons instead of 300 tons as reported last week.

Michigan State Fair Grounds, grand stand, 350 tons.

Pennsylvania-Detroit Railroad, bridge over Eureka Road, near Detroit, 180 tons.

Detroit, Toledo & Ironton Railroad, overhead crossing over Michigan Central tracks, 300 tons.

Norfolk & Western Railroad, machine, pipe and tin shops, Portsmouth, Ohio, 120 tons, bids being taken.

Merkel Brothers Co., Cincinnati, warehouse and pipe storage, 150 tons, bids being taken.

Standard Sanitary Mfg. Co., Louisville, Ky., brass finishing building, 200 tons, bids taken Feb. 20.

State of Florida, highway bridge spans and lifting equipment, approximately 300 tons, bids being taken.

The Cities Service Co., 60 Wall Street, New York, 15,000 and 80,000-bbl. storage tanks, tonnage unknown, with auxiliary equipment, for its East Braintree, Mass., plant.

Ford Motor Co., coal handling system, River Rouge, Mich., 2200 tons.

Atwater Kent Mfg. Co., Philadelphia, addition to plant, 1000 tons.

Seamen's Institute, Philadelphia, 300 tons.

Bridge over Mississippi River near St. Paul, 7000 tons.

C. & G. Cooper Co., Mount Vernon, Ohio, factory addition, 100 tons, general contract awarded to H. K. Ferguson Co.

## RAILROAD EQUIPMENT BUYING

### Eighty Locomotives Bought—Inquiries for New Cars and Repairs

The New York Central has bought 80 locomotives, is believed to have fully as many more to place and is expected to take definite steps on car purchases before the end of the week. Inquiries for new cars amount to 1750 and for car repairs to 2100. Car builders are emphatic that reports of secret purchases of large numbers of cars are without foundation. Below are the chief items of interest.

The railroads on Jan. 15 had 159,552 freight cars in need of repair. This was 7 per cent of the total and an increase of 1377 over the number in need of repair on Jan. 1. Of the total 116,876 cars were in need of heavy repairs.

The Pennsylvania Railroad has asked for prices on box car and stock car bodies, but no definite number was stated in its inquiry.

The New York, Chicago & St. Louis Railroad (Nickel Plate) has inquired for 1000 box cars and 300 stock cars.

The Illinois Central Railroad is asking for bids on repainting 2095 freight cars.

The International Great Northern Railroad is in the market for passenger equipment.

The Atlantic Coast Line is inquiring for 50 ballast cars and a number of passenger cars.

The Fruit Growers Express has placed an order for 500 steel underframes for freight cars with the Western Steel Car & Foundry Co.

The Cities Service Co., 60 Wall Street, New York, is inquiring for about 345 tank cars of approximately 8000-gal. capacity.

The Southern Pacific has placed 15 dining cars with the Pullman Co., 23 baggage cars with the Bethlehem Steel Co., 6 baggage horse cars and 7 buffet baggage cars with the American Car & Foundry Co.

Swift & Co., Chicago, are inquiring for repairs on 100 double deck stock cars.

The Great Northern is inquiring for 50 express refrigerator cars.

The Burlington is inquiring for 25 baggage and 5 baggage mail cars.

The New York Central has divided 80 switch engines between the American and Lima Locomotive companies.

The International Great Northern placed 5 Mikado type engines with the Baldwin Locomotive Works.

The Republic Iron & Steel Co., Youngstown, Ohio, which recently announced the reopening of its Boston office in charge of Norman W. Foy, has leased office space at 865 Massachusetts Trust Building, that city.

## NON-FERROUS METALS

### The Week's Prices

Cents per Pound for Early Delivery							
Copper, New York		Straits Tin		Lead		Zinc	
	Lake	Electro-lytic*	New York	New York	St. Louis	New York	St. Louis
Jan.							
30.....	12.87½	12.37½	48.37½	8.65	8.40	6.85	6.50
31.....	12.75	12.37½	49.62½	8.65	8.40	6.90	6.55
Feb.							
1.....	12.75	12.37½	49.50	8.65	8.40	6.90	6.55
2.....	12.75	12.37½	...	8.65	8.40	6.90	6.55
3.....	12.75	12.37½	50.12½	8.65	8.40	6.95	6.60
4.....	12.75	12.37½	51.00	8.65	8.40	7.00	6.65

\*Refinery quotation; delivered price ¼c. higher.

### New York

NEW YORK, Feb. 5.

All the markets except copper are moderately active and strong. Copper has receded but tin has advanced. Lead continues scarce and is again higher and the advance in zinc has continued.

**Copper.**—After the large buying noted a week ago there has been a decided lack of demand although, had it not been for the recession in prices in the last week, it is probable that consumers would have bought considerably more copper. It is stated that there have been inquiries for several million pounds, one for 3,000,000 lb. and another for 1,500,000 lb., but buyers have been holding back because of the softness of the market. Electrolytic copper is quoted by producers at 12.62½c., delivered, but it is stated that some is available at second hands at 12.50c., delivered. The market is not strong, but it is probable that as soon as it becomes stabilized, quite a little more buying will materialize. Lake copper is quoted at 12.75c., delivered.

**Copper Averages.**—The average price of Lake copper for the month of January, based on daily quotations in THE IRON AGE, was 12.94c., New York. The average price for electrolytic copper was 12.46c., refinery, or 12.71c., delivered.

**Tin.**—Two features of interest have characterized the Straits tin market the last week: One is the better price for sterling exchange and the other is the fact that there has been actual buying by London houses in this market because it is at present the cheapest one. This London buying has been on a fairly large scale. During the week covered by this report at least 1000 tons has changed hands. Yesterday business was fairly lively with consumers doing some of the buying and with total sales on that day about 400 tons. On other days of the week dealers were the principal buyers. The February tin position is improving and it is thought that it may sell at premium prices in the near future. There is a tendency for spot metal to be tight, with the possibility that the premium over futures which were high a week ago may again be a feature. Spot Straits tin today was quoted at 51c., New York, with the market moderately active and fairly large sales made. The London market advanced today about £6 per ton, bringing prices about £9 per ton higher than a week ago, spot standard being quoted at £257 5s., future standard at £256 5s. and spot Straits at £260 5s. Statistics for January show that the deliveries of tin for the month were 4895 tons, with 2812 tons in stock and landing on Jan. 31. Imports for the month were 6055 tons. Arrivals thus far this month have been 875 tons, with 11,670 tons reported afloat.

**Lead.**—On Feb. 1 the leading interest again advanced its price \$3 per ton, or from 8c. to 8.15c., New York. February metal is decidedly scarce and prices in the outside market are more or less nominal at 8.40c., St. Louis, and 8.65c., New York, these prices even including early March delivery. Demand continues heavy with increase in production insufficient to cause an easier market.

**Zinc.**—Prime Western zinc has advanced in the last week to the highest levels in several months. Increases in the price of ore resulting in higher cost of production, as well as demands from operators and dealers,

have been two of the causes. Consumers have also been fair buyers. While there have been some sales for export, prices in London and on this side are not yet favorable to large transactions. For early delivery prime Western is quoted at 6.65c., St. Louis, or 7c., New York, at which levels actual business is reported today.

**Nickel.**—Quotations for shot and ingot nickel are unchanged at 29c. to 32c. per lb., with electrolytic nickel held at 32c. by the leading producers. In the outside market both shot and ingot nickel are quoted at 29c. to 32c. per lb.

**Antimony.**—Scarcity of Chinese metal continues and wholesale lots for early delivery are still firm at 10.50c. per lb., duty paid, New York, with the possibility of higher prices, since metal from China is now held at the equivalent of 11c., New York.

**Aluminum.**—Virgin metal, 98 to 99 per cent pure, is quoted at 27.50c. to 28c. per lb., duty paid, delivered, by importers able to obtain the metal from foreign producers. Quotations from the leading American producer are not obtainable.

**Old Metals.**—The market is quiet and inquiry has slowed down. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible .....	12.25
Copper, heavy and wire .....	11.25
Copper, light and bottoms .....	10.00
Heavy machine composition .....	10.50
Brass, heavy .....	8.00
Brass, light .....	6.25
No. 1 red brass or composition turnings ..	9.00
No. 1 yellow rod brass turnings .....	6.75
Lead, heavy .....	7.75
Lead, tea .....	6.50
Zinc .....	5.00
Cast aluminum .....	18.50
Sheet aluminum .....	18.50

### Chicago

FEB. 5.—Lake copper has declined following sales of distress material, while the electrolytic metal has remained unchanged. On the other hand, tin, lead and zinc have advanced. The strength of lead appears to lie in the fact that producers have not permitted their output to exceed consumption. Zinc has advanced because of export business made possible by a rise in sterling exchange. Old metal prices are unchanged. We quote in carload lots: Lake copper, 13c.; tin, 50.50c.; lead, 8.50c.; spelter, 6.65c.; antimony, 12c., in less than carload lots. On old metals we quote copper, copper wire, crucible shapes and copper clips, 10.50c.; copper bottoms, 9.50c.; red brass, 8.75c.; yellow brass, 7c.; lead pipe, 6.75c.; zinc, 4.25c.; pewter, No. 1, 28c.; tin foil, 34c.; block tin, 39c.; all buying prices for less than carload lots.

### Short Haul Steel Rates Attacked

WASHINGTON, Feb. 4.—Short haul steel rates between western Pennsylvania, eastern Ohio and northern West Virginia are attacked in a brief filed with the Interstate Commerce Commission and the Ohio Railroad Commission by Assistant Traffic Commissioner Andrew H. Brown of the Cleveland Chamber of Commerce. Mr. Brown maintained that the railroad instead of undertaking to prove that existing rates are unremunerative had fixed the fifth class rate, Pittsburgh to Cleveland, as the standard to measure the proposed rates. He declared that the carriers should not be permitted, in efforts to avoid fourth section (long-and-short-haul) violations. It was contended by Mr. Brown that the adjustment necessary could be properly made by the publication of through commodity rates without serious effect upon the revenues and thus avoid imposition of increases upon rates already relatively high. To permit the proposed rates to become operative, Mr. Brown said, would disrupt existing relationships and groupings for which no sufficient justification appeared.

Practically all departments of the Pennsylvania Railroad shops at Altoona, on a 40-hr. week basis, since Dec. 1, last, returned to the 48-hr. a week schedule Feb. 1. More than 10,000 men were affected.

## PERSONAL

Hobart Ames, for nearly 23 years president of the Ames Shovel & Tool Co., Boston, has resigned and Alfred C. Howell, plate sales agent of the Bethlehem Steel Co., has been elected his successor, Mr. Howell having previously been elected a director. The change in the office of the president is to become effective Feb. 15. Mr. Ames will remain as one of the directors but intends to devote more of his time to private interests.

Mr. Howell's connection with the steel industry extends over 26 years. He started at the Homestead mill of Carnegie Steel Co. in 1897, and later was in the general offices at Pittsburgh, continuing until 1910, when he went to Cincinnati as sales representative of the Carnegie company. He was there six years and in 1916 became manager of the steel department of the W. Bingham Co., Cleveland. In 1919 Mr. Howell was appointed manager of the structural sales department of the Midvale Steel & Ordnance Co., later becoming manager of sales in the Philadelphia district for the same company and continuing in the latter position until the acquisition of the Midvale company by the Bethlehem Steel Corporation. He was then appointed plate sales agent, with headquarters at Bethlehem, Pa.

Frank B. Zeller, formerly purchasing agent of the New York Air Brake Co., New York, is now associated with the McLean Mfg. Corporation, manufacturer of leather belting, New York, as manager in charge of sales.

Drew M. Thorpe has resigned as Pittsburgh district manager of sales for the United States Refractories Co., Mount Union, Pa., to become Buffalo district manager of the General Refractories Co., with offices in the Ellicott Square building. Mr. Thorpe was with E. J. Lavino & Co., Philadelphia, for several years and before going with the United States Refractories Co., had charge of refractories sales in its Pittsburgh office.

George A. Forbes, formerly attached to the Buffalo sales office of the General Refractories Co., has been transferred to the company's Pittsburgh office, of which E. A. McKelvey is manager.

W. Y. Stroh, president Stroh Steel Hardening Process Co., Pittsburgh, leaves for Europe within a few days for an extended study of foreign markets. Increasing business with South Africa, New Zealand and Australia has made it seem desirable to establish production in Great Britain, Mr. Stroh says in connection with his trip abroad.

C. D. Dreifus, president Charles Dreifus Co., Pittsburgh, accompanied by Mrs. Dreifus and Albert C. Lehman, president Blaw-Knox Co., Pittsburgh, has started for Riviera, France, where they will spend the remainder of the winter.

L. H. Welling has been appointed manager of the Eastern office for the Graver Corporation, East Chicago, Ind., manufacturer of tanks, filters, etc., with which he has been connected for several years. His headquarters will be at 5045 Grand Central Terminal, New York.

A. H. Ferbert has been elected vice-president of the Pittsburgh Steamship Co., Cleveland, to succeed A. F. Harvey, who was recently elected president. Mr. Ferbert, who has been with the company since 1904, became the traffic manager in 1922, succeeding E. C. Collins, who resigned to become affiliated with the Crucible



A. C. HOWELL

Steel Corporation of America, of which he is now president.

Charles H. Wagner has been appointed sales manager of the American Fork & Hoe Co., Cleveland, filling the vacancy caused by the recent death of Silas Reimer. Mr. Wagner has been assistant sales manager.

H. D. Moss, formerly with the J. M. & L. A. Osborn Co., Cleveland, has become Cleveland district manager of the Sheet Metal Mfg. Co., Youngstown, Ohio, with offices at 401 Swetland Building.

Carlos E. Holley, formerly with the Antrim Iron Co. at Mancelona, Mich., has accepted a position as mechanical and electrical engineer with the Mohawk Mining Co., Mohawk, Mich.

Ralph E. MacDonald has been appointed sales manager of the Savage Mountain Fire Brick Co., Frostburg, Md., succeeding Clarence Overend. Mr. MacDonald will have his office at 1001 Federal Reserve Building, Pittsburgh.

H. P. Pope has resigned as western representative of the Thomas Spacing Machine Co., manufacturer of tools, Fulton Building, Pittsburgh. For the present the business in the Chicago territory will be handled from Pittsburgh.

Edward M. Griffith, who for about 15 years has been connected with Crucible Steel Co. of America in both an operating and a sales capacity, has been appointed general sales manager for the Standard Gage Steel Co., Beaver Falls, Pa.

George Roohm has been elected president of the Motors Metal Mfg. Co., Detroit, for the current year. William Christian was elected vice-president; Robert McMath, treasurer and general manager, and Wilson C. Johnson, secretary.

George O. Desautels, formerly for eight years vice-president and general manager of the Imperial Drop Forge Co., Indianapolis, has severed that connection to become district representative in Indiana, with headquarters at 335 Postal Station Building, Indianapolis, for the Heppenstall Forge & Knife Co., Pittsburgh. Mr. Desautels has been connected with the drop forge industry for 25 years. His first association was with Paige & Storm, Chicopee Falls, Mass., where he served his apprenticeship in the die room. His first official position was with Columbus Forge & Iron Co., Columbus, Ohio, in 1902, as superintendent, which position he held for seven years. In 1915 he organized the Imperial Drop Forge Co. and in the previous year helped to organize the American Drop Forge Association, composed of prominent drop forge companies, and which was merged with the Drop Forge Institute about a year ago.

J. J. Swan of the Engineering Business Exchange, 30 Church Street, New York, who will also be remembered for his long connection with the compressed air industry, has been appointed lieutenant colonel in the Officers Reserve Corps, U.S.A., and has been assigned to the reserve division, Second Corps Area.

J. Newton Gunn, who resigned last year as vice-president of the United States Rubber Co., has established consulting offices at 247 Park Avenue, New York, and will pay attention particularly to the management of industrial properties, organization, personnel, marketing and valuations.

Edmund C. Mayo, who resigned some time ago as president of the American Tube & Stamping Co., Bridgeport, Conn., to become vice-president of the Gorham Mfg. Co., Providence, R. I., will be succeeded in



G. O. DESAUTELS

the Tube & Stamping company by William R. Webster. E. Kingsbury Curtis has been elected chairman of the board and Ellis M. Johnston, vice-president and treasurer. Mr. Curtis and Mr. Webster have long been connected with the company. Mr. Johnston recently resigned as Western district manager of the American Rolling Mill Co., Middletown, Ohio. E. W. Harrison of the Tube & Stamping company is on a vacation in Europe. When he returns he will probably resume active connection with the company as special representative.

Gust Olson, Jr., until recently chief engineer of the Yellow Sleeve Valve Engine Co., Moline, Ill., has been appointed sales representative in the "Tri-Cities" and Iowa territory with headquarters at Moline, for the E. L. Essley Machinery Co., Chicago.

Clyde Wisenburgh, formerly sales representative of the Standard Bearings & Equipment Co., Plainfield, N. Y., has become associated with the sales organization of the U. S. Ball Bearing Co., Chicago.

T. J. Forde, who for 14 years was with Stone & Webster, Inc., New York, in the division of constructing and engineering, has become associated with the Eagan-Rogers Steel & Iron Co., Crum Lynne, Pa., as secretary and assistant treasurer, in addition to other duties as assistant to the manager.

E. A. Wursler, secretary-treasurer the Falk Corporation, Milwaukee, has retired and has been succeeded by Clarence R. Falk.

Paul J. Kalman, who has been president of the Globe Steel Tubes Co., Milwaukee, has been elected chairman of directors. Frank J. O'Brien, formerly vice-president and general manager, becomes president, and John W. Floto of Chicago, who has been general manager of sales, has been elected vice-president.

Judge Elbert H. Gary, chairman United States Steel Corporation, accompanied by Mrs. Gary, sails from New York today on a trip to South America. They will be on their journey about two months and will visit Panama, Valparaiso, Santiago, Buenos Aires, Montevideo and Rio de Janeiro.

John A. Topping, chairman of the board Republic Iron & Steel Co., will leave New York, Feb. 10, for a month's stay in Florida.

Theodore W. Robinson, vice-president Illinois Steel Co., Chicago, sailed from New York this week on a Mediterranean tour.

J. V. Emmons, metallurgist, Cleveland Twist Drill Co., Cleveland, will deliver an address on the annealing of tool steel at the regular monthly meeting of the Chicago chapter of the American Society for Steel Treating, which will be held Thursday, Feb. 14, at the City Club, Chicago. The meeting will convene at 8 p. m., preceded by a dinner, which will start at 6.30 p. m.

## OBITUARY

ALEXANDER L. HOERR, for the past 8 years chief engineer of the National works, National Tube Co., McKeesport, Pa., died at his home in that city, Jan. 28. He was born in Pittsburgh in 1873 and was educated at Park Institute and the University of Pittsburgh, from which he graduated in 1895. For several years he was associated with the engineering departments of the Jones & Laughlin Steel Corporation and the Lackawanna Steel Co. He was a member of the Engineers' Society of Western Pennsylvania.

KARL W. MOYNES, whose body was found in the harbor off Marblehead, Mass., on Feb. 1, was president and manager Union Drawn Steel Co., 200 Devonshire Street, Boston. Mr. Moynes was active in business up to a day or two before he went to Marblehead to receive treatment in a sanatorium there. He was known widely as a yachtsman, having sailed from Marblehead many years. His home was in Brookline, Mass.

## Judge Gary's Tribute to ex-President Wilson as Statesman, Scholar, Orator

Elbert H. Gary, chairman United States Steel Corporation, pays the following tribute to Woodrow Wilson:

"The death of ex-President Wilson, following a serious illness of several years, will cause a shock of grief throughout the whole universe, and a feeling of deepest sympathy for the family will find lodgment in the hearts of the people generally.

"Mr. Wilson was a great man, a profound scholar, a statesman of high rank, an orator equal to the best. His ability to choose words and construct sentences for the expression of his views was remarkable.

"In many respects, President Wilson was one of the ablest of all the Presidents of the United States. He had a very wide influence upon world affairs. From the time the United States entered the late great war until the armistice was signed, the work done by President Wilson was of the highest order. His knowledge, his wishes, his keen perception and his influence were patriotically dedicated to the cause of justice, and what he did for the protection of civilization will never be forgotten. The record of his achievements, even though sometimes it may be unfavorably criticized, will occupy a high and honorable place in history. If substantial mistakes were made, they were chargeable to subordinates and not to Mr. Wilson himself. Naturally a little autocratic, he sometimes appeared to be indifferent to the opinions of his immediate associates, but his intentions were good and his own decisions were generally right. All in all, his record as President will sooner or later rank high in comparing him with other Presidents. For many things he did and secured, the nation is indebted and will be grateful."

## Empire Works of Brier Hill Steel Co. Sold to Jacob D. Waddell

PITTSBURGH, Feb. 4.—Jacob D. Waddell, until last May president Mahoning Valley Steel Co., Niles, Ohio, recently completed negotiations for the purchase from the Youngstown Sheet & Tube Co. of the Empire works of the Brier Hill Steel Co. at Niles, Ohio.

This plant, which was built in 1902, consists of 8 black sheet mills, 3 cold mills, 15 coal-fired heating furnaces, 6 box annealing furnaces and 4 galvanizing pots. The principal products of the plant have been black and galvanized sheets and formed roofing. Annual capacity is 40,000 tons black sheets, while the galvanizing capacity is 41,600 tons yearly.

The plant has been idle for several months but was to have been placed in operation next week and Mr. Waddell, when seen by THE IRON AGE representative here today, said it was his intention to start operations as soon as the inventory could be completed. This, he said, would be a matter of about two weeks. Although the plant is equipped to produce galvanized sheets, it is not Mr. Waddell's intention to make this grade for the present. The mill will make black sheets only.

Mr. Waddell is acting alone in this transaction, which was concluded this afternoon, when the directors of the Youngstown Sheet & Tube Co. approved the sale. A new company is to be formed in which Mr. Waddell will hold a majority interest. Modernizing of the plant will not be started right away, but is planned for the future.

Production figures of the Ford Motor Co. announced Jan. 24, showed a total of 2,200,682 automobiles, trucks and tractors produced in 1923. This figure included 1,915,485 automobiles and trucks made in the United States, 175,474 made in Canada and other foreign plants, 101,898 tractors and 7825 Lincoln cars. The total exceeds the record production of 1922 by 775,059. The Ford production in the United States fell only slightly short of 48 per cent of the entire output.

## Iron and Steel Markets

(Concluded from page 475)

**Bolts, Nuts and Rivets.**—The recent price advance on bolts and nuts appears to have stimulated specifications and some small lot sales have been made at the advance. So far there are no reports of shading of the higher prices. The rivet market continues weak owing to the need of manufacturers for orders. The leading local producer has advised the trade that until further notice its price will be 2.75c. for large rivets and 70 and 10 per cent off list for small rivets for immediate specifications. Most consumers are under contracts at 2.90c.

**Sheets.**—Some of the automobile companies are inquiring for autobody and blue annealed sheets for the second quarter and one Valley mill has taken some business in black and blue annealed sheets at that delivery at present regular prices which makers think will hold through the second quarter. Mills are getting a fair volume of current orders and some are entirely sold up for the first quarter. However, others are able to make deliveries in two to four weeks. Quotations of 3.75c. on black and 4.90c. on galvanized sheets are still appearing, but blue annealed sheets are firm at 3c.

**Warehouse Business.**—Jobbers report an improvement in business both in the number and size of orders. Prices are firm and unchanged.

Jobbers quote steel bars, 3.36c.; plates and structural shapes, 3.46c.; No. 28 black sheets, 4.40c. to 4.65c.; No. 28 galvanized sheets, 5.60c. to 5.75c.; No. 10 blue annealed sheets, 3.60c. to 4c.; cold rolled rounds, 3.90c.; flats, squares and hexagons, 4.40c.; hoops and bands, 1 in. and wider and 20 gage or heavier, 4.16c.; narrower than 1 in. or lighter than No. 20 gage, 4.66c.; No. 9 annealed wire, \$3.50 per 100 lb.; No. 9 galvanized wire, \$3.95 per 100 lb.; common wire nails, \$3.60 base per 100 lb.

**Tool Steel.**—The market on high speed steel is dull and weak. Some mills are quoting 18 per cent tungsten steel at 65c. to 70c. per lb., and the lower price might be shaded.

**Reinforcing Bars.**—The market on soft steel reinforcing bars is firmer and 2.30c. has become a more common minimum price, with some business being taken at 2.40c. On rail steel bars 2.10c. is the common quotation. Small lots are in good demand and an inquiry is pending for 300 tons for the University of Minnesota stadium.

**Semi-Finished Steel.**—The strengthening of the market is indicated by the purchase of 1000 tons of slabs by a Cleveland consumer from a Youngstown mill for prompt shipment at \$42.50, Youngstown. Inquiry is light, as most consumers are under contract, but the supply is very limited.

**Coke.**—The coke market is quiet with prices unchanged at \$5 to \$6.50 for standard Connellsville foundry coke for prompt shipment.

**Old Material.**—Weakness has developed in the scrap market and most grades are about 50c. a ton lower. Heavy melting steel scrap has not changed locally, but this grade is now quoted at \$21.50 to \$21.75 in the Valley district, or somewhat lower than it has been. A break in prices late in the week has been followed by a somewhat firmer tendency but not sufficient to bring prices back to their former levels. Present quotations on borings and turnings are 50c. a ton lower than a week ago and busheling and railroad wrought scrap are down \$1 a ton. Mills appear to have discontinued buying which accounts for the softness and a large Youngstown consumer has held up shipments.

We quote dealers' prices f.o.b. Cleveland per gross ton:

Heavy melting steel.....	\$19.00 to \$19.50
Rails for rolling.....	20.00 to 20.50
Rails under 3 ft.....	21.00 to 21.50
Low phosphorus melting.....	21.50 to 21.75
Cast borings.....	16.50 to 16.75
Machine shop turnings.....	15.75 to 16.00
Mixed borings and short turnings.....	16.25 to 16.50
Compressed sheet steel.....	17.75 to 18.00
Railroad wrought.....	16.75 to 17.00
Railroad malleable.....	21.00 to 21.50
Light bundled sheet stampings.....	14.75 to 15.00
Steel axle turnings.....	17.00 to 17.50
No. 1 cast.....	22.00 to 22.50
No. 1 busheling.....	15.00 to 15.50
Drop forge flashings.....	14.50 to 15.00
Railroad grate bars.....	19.00 to 19.25
Stove plate.....	19.00 to 19.25
Pipes and flues.....	15.00 to 15.50

## San Francisco

### Marked Improvement in General Situation— More Demand for Pig Iron

SAN FRANCISCO, Jan. 22.—There is very little change in iron and steel trade conditions as compared with two weeks ago except that the onward trend of improvement continues. There is a clearly defined recovery from the apathy at the close of last year and nearly all the expressions of business opinion now show a growing confidence that the betterment will continue for some months. Inventories now nearly completed show, in many instances, the smallest carry-over stocks for several years. Recent indications of improvement in some of the leading industrial centers of the Eastern States have had a stimulating influence on the Pacific Coast. This applies not alone to this central part of the State but to the Los Angeles district and the Sacramento Valley section. Private advices from Portland, Ore., and the Pacific Northwest indicate more activity in those localities, so the entire Pacific Coast seems to have a propitious outlook.

**Pig Iron.**—Importers report more liberal buying and a willingness to place orders involving round lots for future delivery. An order for 1000 tons, recently booked is for delivery within 90 days, while another order for 500 tons is wanted before March 15. Prices are still quoted at \$33 to \$34 per ton and there is more firmness to these figures than two weeks ago. While most of the purchasing now in progress is for moderate quantities, several sales of large lots now being negotiated are expected to be closed in the near future. There has been some buying here for Los Angeles account and the trade there shows greater volume now than at the beginning of the year. Both foundries and mills report business better thus far this year than it was at this time last year.

**Coke.**—There has been marked betterment in this line since the beginning of the year; in fact, the activity is of greater volume than at any time for nearly six months. Several thousand tons have been placed during the last few weeks and inquiries are in the market for additional tonnage. The bulk of this coke is foreign but the domestic stock is also meeting with ready sales. The quotable price is still \$20 per ton for the imported and the domestic is higher based on the Eastern price. Three or four cargoes or partial cargoes are en route and will arrive before the end of February and at least two vessels are now loading.

**Finished Steel and Iron.**—Mills and foundries are reported busy with more orders booked than at this time last year, particularly for those descriptions of material used in reinforcing concrete construction. Prices are the same as quoted two weeks ago but there is a firmer undertone to the market than at that time. In these lines also the reports from the Eastern States have had much to do with strengthening the local situation. The recent exports to Japan have included large quantities of hardware and machinery. While this figures as exports from this port, only a small portion of the total originated here, the bulk of it being merely in transit from Eastern points, Chicago and Cleveland being mentioned as sources of supply.

**Old Material.**—Thus far the market for scrap has not participated to any marked extent in the improved conditions noted in the iron and steel trade. The mills and foundries are buying in very small parcels and business is reported about the same as a month or six weeks ago. Prices show no variation, \$13.50 to \$14 being maximum figures for the most desirable grades. Local supplies are plentiful and sellers do not look for much, if any, change for the next 30 days.

Contract for the construction of the first unit of the plant of the Blair Strip Steel Co., New Castle, Pa., has been awarded to Smith & Bauman of that city. The building is to be completed by May 1. The building, which is to be 50 x 250 ft., and other improvements will cost approximately \$50,000.

## NEW TRADE PUBLICATIONS

**Fuel Oil Shut-off Valve.**—C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. Illustrated bulletin describing valve, which, connected in fuel lines of oil-burner equipped boilers, shuts off automatically the oil flow when the steam or air pressure used for atomizing falls below the minimum required. The valve locks itself and cannot be reopened until the trip lock mechanism is reset by hand. The device is intended to prevent oil leakage into the furnace and the consequent danger of explosion.

**Steel Turnings Crusher.**—American Pulverizer Co., St. Louis. Six page survey describing the performance of one of the company's machines used by a large automobile company. The cost of operation and net savings per year are given, and the operation of the crusher and details of economies effected are outlined by the superintendent of tools and equipment of the automobile company using the machine.

**Steam Pumps.**—M. T. Davidson Co., 154 Nassau Street, New York. Bulletins Nos. 101, 102 and 103, to go with the regular catalog of Davidson steam pumps in a convenient loose leaf form. Useful tables and other data valuable to engineers are given.

**Twin-Con Valve.**—John Foerst & Sons, Bayonne, N. J. 4-page pamphlet describing a control valve for the use of oil-burning equipment under boilers and otherwise. This device can be locked in position, once the proper proportion of air and oil is reached.

**Graphic Instruments.**—Esterline-Angus Co., Indianapolis. 8-page bulletin 124, describing graphic meters for electrical measurement. The new meter is furnished in three types—for mounting on a wall, for switch-board use and portable. The frame is of bakelite, there is a special damping device and the arrangements for installing or removing have been worked out to make this easy. Various types of operating clocks are available.

**Cupola.**—Whiting Corporation, Harvey, Ill. Catalog 171 of 48 pages is devoted to the design and construction of heavy foundry cupolas and their appurtenances. The catalog is full of halftones and line cuts illustrating details or showing the equipment in use, while tables of sizes and capacities give the information needed by the average foundry owner in deciding upon his units. The table of sizes includes cupolas from  $\frac{1}{4}$  ton to 30 tons per hr. with shell diameters ranging from 27 to 108 in.

**Safety Panels and Cabinets.**—Crouse-Hinds Co., Syracuse, N. Y. Folder illustrating various types of panels and cabinets for modern electric distribution systems. These are designed particularly for schools, asylums, factories, stores, office buildings, hotels, etc. They are fitted with locks as precaution against unauthorized handling.

**Condulets.**—Crouse-Hinds Co. Bulletin No. 2054 of 12 pages is devoted to the small receptacles for switches, known as condulets. Several different types are shown, with information as to capacities, weights, etc. A table of dimensions permits the designer to arrange his clearances.

**U-Fin Cooler.**—Griscom-Russell, 90 West Street, New York. Sixteen-page catalog of cooling equipment designed for the use of large electric generators. This equipment, located beneath the generator, cools the air driven through the generator passages by its fan. This device is recommended in place of cooling by a spray of water, as it avoids the moisture. The cooling surface carries water on one side, while the air passes on the other. Each element consists of two tubes embraced by a multiplicity of rectangular brass fins pressed on.

**Pickling Control.**—American Chemical Paint Co., Philadelphia. Leaflet C-181 describes a compound "Rodine," which added to the pickling acid confines its action to the removal of scale and rust and prevents the escape of fumes from the pickle tank. It is also claimed to reduce the acid consumption 30 to 50 per cent and to prevent pitting or over-pickling.

**Hand Punches and Bench Shears.**—Whitney Metal Tool Co., Rockford, Ill. Loose leaf catalog describing the company's ball-bearing hand punches, bending fixture, straightening machine, angle iron shear and bench shear.

**Turbine Blowers.**—L. J. Wing Mfg. Co., 352 West

Thirteenth Street, New York. Bulletin 67, 24 pages,  $8\frac{1}{2}$  x 11 in. Describes turbine blowers for providing forced draft for either hand or stoker-fired boilers. Component parts of the blower are described and illustrated, and sections are devoted to the installation of the blowers. The application of the blowers to underfeed and chain grate stokers is also outlined.

**Safety Valves for Gas Welding Equipment.**—Mattingly Automatic Valve Co., St. Louis. Folder describing valve installed between the hose connection and regulator of gas welding and cutting equipment to prevent spreading of fire, burned hose, waste of gas and damaged regulators. The device is available in styles to fit any make of regulator.

**Grinding and Polishing Machinery.**—St. Louis Machine Tool Co., St. Louis. Group of circulars describing grinding and polishing machines, equipped with babbitt or ball bearings, describing also roller-bearing loose pulleys and hanger box.

**Electric Testing Instruments.**—Roller-Smith Co., New York. Bulletins No. 210 and No. 400. Data given on direct-current portable ammeters, voltmeters, galvanometers, shunts, multipliers and other instruments. Bulletin No. 400 is devoted to direct current switchboard instruments.

**Lighting of Steel Mills and Foundries.**—Edison Lamp Works, General Electric Co., Harrison, N. J. Bulletin 150 of 32 pages, devoted to the subject covered in the title, brings out clearly the fact that the character of the walls and other reflecting surfaces in steel mills is such as to furnish no aid in the diffusion of light. The lighting fixtures themselves must be relied upon to give all of the light in the places where it is needed and without reference to reflection. Large areas, high ceilings, dark surroundings and a smoky, dust-laden atmosphere make the problem one of considerable difficulty and require the greatest care in planning the installation to obtain proper and safe lighting without excessive cost. Different processes require differing intensities of illumination, thus varying the sizes and locations of lamps. Periodic cleaning of the lighting equipment must be provided for and is found to pay good dividends on its cost.

**Truck Loader.**—George Haiss Mfg. Co., Inc., New York. Bulletin 124, describing the company's new highway loader with Fordson power plant, designed for road contractors' work.

**Die Sinking Milling Cutters.**—Tomkins-Johnson Co., Jackson, Mich. Loose leaf catalog of more than 30 pages giving dimensions and list prices on McDonald angle cutters, end mills, roughing cutters, ball cutters and boss cutters. A section is devoted to cutters and vices used on mechanical die sinking machines.

**Electric Indicating Instruments.**—Westinghouse Electric & Mfg. Co., East Pittsburgh. Circular 1664, 24 pages, entitled, "Indicating Instruments for Direct and Alternating Currents." Besides a review of the development of electricity with special reference to the development of alternating current and the earlier alternating-current instruments, there is also a story of the research that resulted in the new instruments.

**Pressure-Gravity-Syphon Burner.**—Combustion Engineering Corporation, Broad Street, New York. Four-page folder devoted to the Quinn oil burner operated by steam and made in three sizes varying from 1 to 120 gal. of oil per hr. The burner is recommended for use in furnaces, boilers, oil stills, cracking coils and other industrial heating units. It is designed to burn any grade of fuel oil or tar without carbonizing or clogging up of oil passages. Air, as well as steam, may be used for atomizing and the oil may be fed by either pressure or gravity.

**Lighting for Traffic Control.**—Edison Lamp Works, General Electric Co., Harrison, N. J. Bulletin 147 of 32 pages covers night control of traffic on land, on the water and in the air. It deals not only with the lamps and auxiliary apparatus for producing the lights, but with railroad and interurban signalling, control of heavy street traffic, the marking of channels for boats, and of landing places for aircraft. The bulletin is well illustrated with different types of apparatus and arrangements of installation.

A booklet of 32 pages on electric motors—how to choose and use them—has been issued by the Reliance Electric & Engineering Co., Cleveland. The operation of a motor, installing of power supply, power needed, load factor, how power is figured, selecting and installing the motor, keeping the motor fit, starters and regulators and other information is briefly given.

## Plans of New Companies

The Lincoln Engineering Co., 1501-5 East Indiana Street, Evansville, Ind., has been organized to manufacture pipe coils for refrigeration work of all kinds, also brine tanks, condensers and ammonia receivers for refrigeration work. The company has leased a plant and has sufficient equipment for the present. Some of the work may be done by contract. G. C. Bruner is president and F. G. Hofacker is vice-president.

The Acme Electric Fuse Corporation, 232 Marcholf Avenue, West View, Pa., has been incorporated with \$100,000 capital stock, to manufacture renewable cartridge enclosed fuses and non-corroding high tension links. The company has a plant and equipment for manufacturing on a small scale, but will be required to rent a warehouse in Pittsburgh and later will erect a building in Western Pennsylvania. Some work has been contracted for with the National Acme Automatic Screw Machine Co. Samuel J. Maisel heads the company.

The Bliven Shade Hanger Co., Vincennes, Ind., has been organized to manufacture metal shade and drapery hangers. Method of manufacturing has not been decided. W. C. Blevins is president; Perry D. Green, secretary and George E. Gardner, treasurer.

Monteigh Brothers, 2208 South Main Street, Elkhart, Ind., has been incorporated with \$25,000 capital stock to take over the business formerly conducted at the Ford Parts Exchange. The company will manufacture armature winding machinery. The company has plant and equipment sufficient for present needs. R. C. Monteigh, president; M. L. Monteigh, vice-president; C. E. Monteigh, secretary and treasurer.

The Baker Steel & Machinery Co., 120 North Forty-third Street, Omaha, Neb., has been incorporated with \$25,000 capital stock and will manufacture car unloaders, winches, builders' hoists and attachments for tractors. It has built a small plant, but the manufacturing of castings and other parts will be let out to contract. W. F. Baker is president and C. L. Waldron, secretary-treasurer.

The Ingot Iron Railway Products Co., Crawfordsville, Ind., organized with \$50,000 capital stock, will do a jobbing business in railroad equipment. J. B. Frazer heads the company.

The Maine Oil Heating Co., 236 Federal Street, Portland, Me., has been organized with nominal capital to act as distributor of oil heating apparatus. W. C. Goodwin is treasurer.

The McVicker Railclamp Tieplate Co., 221 Grand Avenue, Milwaukee, has been incorporated with \$1,000,000 capital stock, Delaware laws, to manufacture rail anchor tie plates. A factory has been purchased at Winthrop Harbor, Ill., 140 x 160 ft., including a separate office building. Although work is now being done by contract, the company will do its own manufacturing as soon as machinery can be installed. It is in need of two large presses, one between 400 and 500 tons, the other about 300 tons; also squaring shears, a small forging hammer and machine shop equipment. The officers of the company are E. M. McVicker, president; A. M. Masters, vice-president, and J. E. Radtke, secretary. The company is successor to the Railway Safety Tie Co.

The McNab Kitchen Rudder Corporation, Bridgeport, Conn., has been incorporated with \$100,000 capital stock to manufacture reversing rudders and gears. All work will be done under contract. Officers have not yet been elected. Address in care of Alexander McNab, Brooklawn Park, Bridgeport.

The Duty Air Brake Co., Harrisville, W. Va., has been incorporated with \$20,000 capital stock to manufacture automobile air brakes. Work so far has been done by contract, but the company is open for bids on outfits. C. B. Lewis is general manager.

The Radio Condenser Co., Thorne Street, Camden, N. J., has been incorporated with 5000 shares of stock, no par value, to manufacture radio condensers. The company has a factory completely equipped, with about 4000 sq. ft. of floor space. Other lines of manufacture may be taken up later. Stanley S. Cramer is president; Joseph J. Leinmiller, secretary-treasurer, and Russell E. Cramer, production manager.

The Mann & Briggs Mfg. Co., 2135 Indiana Avenue, Chicago, has been incorporated with 2000 shares of stock, no par value, and is manufacturing cell testers and battery testing devices. All manufacturing is done through the Jewell Electrical Instrument Co., Chicago. George L. Briggs is vice-president.

The Bulldog Automatic Coupler Co., Inc., Pikeville, Ky., has been incorporated with \$25,000 capital stock, to manu-

facture couplers. The company will act as a holding company and will do its manufacturing through outside companies. A. J. Baldwin is president; O. S. Batten, vice-president and secretary, and A. L. Nunnery, treasurer.

The Panyard Piston Ring Co., 449 Wethersfield Avenue, Hartford, Conn., recently organized, will act as distributor of Panyard piston rings in Connecticut. C. E. Thompson heads the company.

J. A. Coates & Sons, Ltd., 585-93 Main Street, East Orange, N. J., recently organized to manufacture needles and novelties, will represent manufacturers of these lines in England, Germany and East Orange, N. J. The officers of the company are: A. Stanley Wright, president; A. A. Wright, vice-president, and B. E. Wright, secretary.

The Albaugh-Dover Mfg. Co. has been organized with \$200,000 capital stock as a reorganization of the Albaugh-Dover Co., Chicago, effected by former stockholders and bondholders. The new company will continue the production of gears and cream separators. Directors include P. A. Mortenson, R. B. Harter and Walter E. Smith. F. G. Eppley, who has had charge of manufacturing of the Albaugh-Dover Co. for 17 years, will conduct production.

The Wireless Products Corporation, 136 Prince Street, New York, has been incorporated with 100 shares of stock, no par value, to manufacture wireless equipment and instruments. Business will be conducted on a small scale. T. F. Thornton, J. P. H. Rieper and I. Skutch are the incorporators.

The Worthy Metal Products Co., New York, has been incorporated with nominal capital to manufacture metal goods. The company is negotiating to purchase a plant at Lafayette Street and later will install equipment for operation on a limited scale. S. J. Billig, J. Hellicher and J. Cohn are the incorporators. Temporary address is in care of Rudolph Stand, 160 Broadway.

The Coy Valve Co., Chehalls, Wash., a brass foundry and machine works, is now ready to begin operation. It is in a position to take care of any casting in brass and to do all kinds of turret and engine lathe work, gear cutting, bushings, crosshead slippers, connecting rod brasses, etc. The company has a drafting department and a fully-equipped pattern shop. T. J. Long is president; William F. West, vice-president, and Charles L. Brown, treasurer.

Holden & Quick, 120 Centre Street, New York, have been incorporated with \$25,000 capital stock to manufacture metal dies and patterns. They have taken over the assets and business of an established company in this line. The incorporators are: A. N. Holden, J. Quick and A. Lossman.

The Rankin Motor Co., New York, has been incorporated with capital of 200 shares of no par value stock and will be established in about two months as distributor for popular makes of marine motors. A. L. Rankin, E. J. Garity and C. F. Kenny are the incorporators.

The William O. Chapman Co., 30 Church Street, New York, incorporated with capital stock of \$35,000, to manufacture wire partitions, wire cloth and kindred products, has acquired the property and business of a manufacturer which had been active in this line for 12 years. The new company has plant and equipment now in operation at 193-7 Diamond Street, Greenpoint. William O. Chapman and F. A. Butler are the principals.

The Advance Battery Corporation, 109 Prince Street, New York, recently incorporated with \$25,000 capital stock, now has plant and equipment and is in production on batteries and electrical specialties. J. Weinberger and H. W. Phillips are the principals.

The Baur Tack Co. and the Baur Bale Tie Co., Indianapolis, operating plants at Standard Avenue and Division Street, for the manufacture of cut tacks, nails and various related wire products, have been incorporated. The companies occupy two modern manufacturing plants which have been in operation since October, 1923. New equipment is being installed and the companies plan to increase production and start the manufacture of additional wire products in a short time. Additional machinery will be purchased as follows: 2 staple machines, 6 wire tack machines, 3 capping machines and 20 Perkins tack machines, sizes No. 2 and 3. About 80 Perkins machines will be purchased later on. Oscar Baur is president of both the new companies and John P. Lonergan is secretary-treasurer. The authorized capitalization of the tack company is \$100,000 and of the bale tie company, \$50,000.

The Pacific Sheet Steel Corporation, 120 Broadway, New York, has been incorporated with capital stock of \$1,000,000 under Delaware laws, to manufacture black, blue annealed and galvanized steel sheets at South San Francisco, Cal. Charles R. Hughes is works manager. E. Becker is one of the heads.

Brooks Steam Motors, Ltd., 1304-7 C. P. R. Building, Toronto, Ont., recently purchased a modern plant in Stratford and is making arrangements to start production on Brooks motor cars. Orders for parts and materials are now being placed. At first the company will concentrate on a single, medium-size model, but later will also produce a larger and a smaller model. Arrangements are under way to begin production in the United States also. P. R. Penhall is one of the principals.

The John Robertson Co., 133 Water Street, Brooklyn, recently incorporated with capital stock of \$500,000 to manufacture machinery, has taken over the business of John Robertson & Co., and will manufacture hydraulic presses and kindred lines. The company is now on a production basis. Work will begin next week on a new two-story addition, which will be equipped and used for machine shop purposes. John Robertson heads the company.

The Ram Metal Products Co., 1848 Webster Avenue, New York, has been incorporated with \$49,000 capital stock to manufacture metal specialties. Plans are not sufficiently developed to warrant any definite announcement. The incorporators are B. Davis, R. A. Moore and M. Weininger.

L. Plaut & Co., 432 East Twenty-third Street, New York, has been incorporated with \$150,000 capital stock and 4000 shares no par value stock, to continue a business established in the manufacture of electrical and gas fixtures. L. Plaut heads the company.

The Triamant Corporation, New York, incorporated with 1000 shares of stock, no par value, to manufacture iron and steel products, will manufacture drills and equipment for mining, construction work and oil well operations. However, the company is still in the formative stage and considerable time will be required to complete matters of organization. F. B. Fremont and E. Lessel are the principals. Temporary address is in care of L. C. Burdett, 233 Broadway, New York.

The Advance Battery Corporation, 109 Prince Street, New York, has been incorporated with capital stock of \$25,000 to manufacture batteries and other electrical equipment. Immediate business will be conducted on a limited scale. J. Weinberger and H. W. Phillips are the principals.

Henry Frank, Jr., Inc., 374 Hudson Street, New York, recently incorporated with \$100,000 capital stock, will act as distributor of hardware products. Henry Frank, Jr., heads the company.

The Baltimore Engineering Co., 1706 North Charles Street, Baltimore, recently organized, is now manufacturing Goebel timing brushes, having leased premises at 314 St. Paul Street. Machinery and equipment have been placed. Most of the work will be done in the company's plant. Henry Mann is president; J. R. Gorman and George Goebel, vice-presidents, and Robert Ilauer, secretary-treasurer.

The National Boiler & Mfg. Co., East Sixteenth Street and Compton Avenue, Los Angeles, Cal., has been organized to manufacture combination gas heaters and range boilers. It has leased a plant and contracted for machinery. No work will be done by contract. G. B. Hinckley is president; D. Elisinga, vice-president; W. R. Smith, secretary, and R. L. Hinckley, treasurer.

The Northern Bronze Corporation, 601 West Hottter Street, Philadelphia, has been incorporated with \$20,000 capital stock and will manufacture brass, bronze and aluminum castings. The company has a plant at 4212-20 Cresson Street, Manyunk, Philadelphia, with 10,000 sq. ft. of floor space. Part of the work will be done by contract. The officers of the company are: Edward S. Oliver, president; James J. Keeley, vice-president; and A. Frederic Leopold, secretary-treasurer.

The Quinn Oil Burner Sales Corporation, Plaza Hotel Building, 87 Sip Avenue, Jersey City, N. J., has been incorporated with \$50,000 capital stock to manufacture oil burners and equipment. Its plant is located on Staten Island, where all manufacturing is done. At the Jersey City address the company maintains a show room, established entirely for sales headquarters. Clifford G. Dutemple is president; Lester Tallman, vice-president, and Mary L. Cooper, secretary-treasurer.

The United Metal Products Co., Battle Creek, Mich., recently incorporated, is a preliminary organization, later to be followed by the transfer to it of the assets and business of the United Steel & Wire Co. Later, upon the dissolution of the old company, the name of the new one will be changed to the United Steel & Wire Co. There will be no change in products or plant, and the officers of the company remain the same. G. J. Geuebach is president.

The Phillips Co., care of the Corporation Trust Co. of America, du Pont Building, Wilmington, Del., has been incorporated with \$300,000 capital stock to manufacture auto-

matic sprinkler machinery. Present activities will be confined to financing sprinkler installations. Thomas H. Gill is president; E. J. Phillips, vice-president, and B. E. Phillips, secretary-treasurer.

The My-Cue Auto Parts Co., Inc., 1315 Main Street, Niagara Falls, N. Y., has been organized to act as distributor for Timken roller bearings and automobile accessories. No manufacturing will be done. M. MyCue is president and treasurer.

The Latendorf Conveying Corporation, 90 West Street, New York, has been incorporated with nominal capital to manufacture conveying machinery, elevators and special machinery. It has secured and equipped a shop and will do general millwright work and power transmission engineering, but will specialize in the conveying line. Business on hand will keep the plant at capacity for a considerable time. C. B. Latendorf heads the company.

The Fager Sheet Metal Works, Inc., 408 Third Avenue, New York, has been incorporated with capital stock of \$25,000, to manufacture sheet metal products. It is a reorganization of a partnership established in this line for some time. The company has a plant and equipment. The incorporators are G. W., G. A., and F. Fager.

The Ideal Aeroplane & Supply Co., 74 Greene Street, New York, has been incorporated with \$15,000 capital stock to manufacture toy aeroplanes and parts. The company has acquired the manufacturing facilities of an active concern. H. Rosenstein, W. Kramer and M. Palmer are the principals.

The California Pump & Machine Corporation, 2668 Long Beach Avenue, Los Angeles, Cal., recently organized, has a fully equipped plant and is manufacturing rotary pumps, special machinery and custom work in metal, and does designing and pattern work. The officers of the company are: Irving B. Conner, president; Charles A. Conner, vice-president, and Mona E. Conner, secretary-treasurer.

H. Lippman & Co., 189 Centre Street, New York, has been organized to buy and sell electric motors, machinery and tools. Mr. Lippman was formerly with the Reliable Electrical Supply Co., 165 Grand Street, New York.

The George M. Price Co., Inc., 2214 Cathrine Street, Philadelphia, has been incorporated, with capital stock of \$800,000, to manufacture castings of a special non-corrosive alloy, also valves, bathroom fixtures and general hardware products. The company will need drill presses, polishing lathes, stamping machines, hammers, and forging and dredging machines. The company is still dealing with organization matters and it is unlikely that it will be on a production basis for some time. George M. Price heads the company.

Lathrop & Trotter, 733 Union Trust Building, Cincinnati, have been organized by Jay C. Lathrop and L. E. Trotter, as representatives of the Conveyors Corporation of America, 326 West Madison Street, Chicago. The new firm will handle steam jet ash conveyors, air-tight doors, cast-iron storage tanks, and general power plant equipment.

The Blue Pump Mfg. Co., 1410 Newstead Avenue, St. Louis, has been organized to manufacture automatic pumps and several kinds of power pumps for water systems, gas plants, etc. The company is occupying the plant of the C. G. Holt Engineering Co. at St. Johns Station, Mo. No equipment will be needed at present. C. G. Holt is president; O. N. Holt, vice-president; E. M. Holt, secretary.

The Edgcomb Steel Co., Philadelphia, has been organized and appointed exclusive agent in that territory for the Standard Gauge Steel Co., Beaver Falls, Pa., which has discontinued its district office at 611 Harrison Building, Philadelphia. Office and warehouse of the Edgcomb company are located at Eleventh and Cambria Streets, where it will carry a complete line of cold drawn shafting and screw stock, flats, squares, hexagons and other specialties. Leslie Edgcomb is president and treasurer; W. H. Franklin, vice-president, and Harry Edgcomb, secretary and general sales manager.

### Consolidated Offices to Move to Wilmington

The general sales and executive offices of the Consolidated Machine Tool Corporation, which were recently moved from New York to Rochester, N. Y., will again be moved shortly to the Hilles & Jones plant at Wilmington, Del. Henry J. Bailey, president of the Consolidated Machine Tool Corporation, is also head of the Hilles & Jones Co., one of the companies which entered the Consolidated merger. The Consolidated Machine Tool Corporation has discontinued the selling of machine tools made by manufacturers other than those in the Consolidated organization and some of these lines will be represented in New York and Chicago territories by the Dale Machinery Co., 50 Church Street, New York, headed by James J. Dale.

# Machinery Markets and News of the Works

## GENERAL ELECTRIC LARGE BUYER

### Orders Placed for New Plant Being Built in Philadelphia

#### Prospective Railroad Buying at Chicago Is Feature—Santa Fe and Chicago, Milwaukee & St. Paul Issue Lists

The General Electric Co., Schenectady, N. Y., bought a large number of machine tools last week for its new switchboard plant in Philadelphia, its total purchases of machines for this plant so far, it is estimated, reaching fully \$250,000.

In the Chicago territory railroad inquiry is the prominent feature. The Santa Fe has asked for prices on 33 additional tools, making a total of 52 now pending for this road. The Chicago, Milwaukee & St. Paul has asked for prices on 44 machines, specifying used or rebuilt equipment whenever possible.

Purchase of the buildings formerly occupied by the

Mitchell Motors Co., Racine, Wis., by the Nash Motors Co. forecasts the purchase of considerable new equipment as the tools in the plant were disposed of previously.

The heaviest buying at Cleveland and Detroit is by automobile companies. The Ford Motor Co. purchased a number of machines and other Detroit car builders also placed orders. The Timken Roller Bearing Co., Canton, Ohio, bought a half dozen tools and is about to close on about that many more. An outstanding order in the New England trade covers about \$25,000 worth of broaching machines for the Willys-Morrow Co., Elmira, N. Y.

The demand for used tools in good condition is active and some dealers report that their business in used tools is in volume equal to that in new tools. Used equipment is coming on the market almost every week. A sale will be held shortly of 200 tools in the plant of the Aultman & Taylor Machinery Co., Mansfield, Ohio, the plant having been purchased recently by the Advance-Rumely Co.

## New York

NEW YORK, Feb. 5.

**T**HE General Electric Co., Schenectady, N. Y., was a large purchaser last week of machine-shop equipment for its new switchboard plant now being built in Philadelphia. The orders went largely to Philadelphia dealers. Purchases for the Philadelphia plant will probably total \$250,000. The Ingersoll-Rand Co., New York, was the purchaser of a large planer, 12 x 12 x 30 ft. The Pullman Co. has given an order to an Eastern company for two axle lathes and three car-wheel borers. The New York Central has sent out additional inquiries for six or eight machines.

January was not as satisfactory in machine-tool sales as had been expected. There are many inquiries but much hesitancy in placing orders. One large company which handles both new and used machines says that its orders are about equally divided between new and used. Most buyers are bargain hunters and many prospective purchasers of new tools eventually buy used tools, of which a great number in good condition are being offered.

The Syracuse Supply Co., Syracuse, N. Y., is in the market for a used steam hammer, single frame, 1500-lb.

M. D. Goodman, 185 Bigelow Street, Newark, N. J., is in the market for a used electric motor, 40 hp., 220 volt d.c., 1750 r.p.m.

The Anheuser-Busch Ice & Cold Storage Co., 979 Brook Avenue, New York, is having revised plans drawn for extensions, with additional equipment, in its five-story plant, Orphuls & Hill, 112 West Forty-second Street, New York, are engineers.

C. B. Christensen, 1628 Union Street, Schenectady, N. Y., has plans for a one and three-story automobile service and machine repair works, 40 x 120 ft. and 40 x 60 ft., respectively, at 214 Clinton Street, to cost approximately \$115,000 with equipment.

The Bureau of Foreign and Domestic Commerce, Washington, has information regarding a proposed sugar refinery

in Argentina, to be constructed by a cooperative sugar growers' association, for which bids will be asked at once. It will have a production of 700 tons of cane grinding per day, and will include a power house, reference No. 35x-b.

The Adirondack Power & Light Co., 511 State Street, Schenectady, N. Y., has plans under way for additions to its generating plant at Spier Falls, N. Y., consisting of a number of 10,000 hp. units, with transmission equipment and power substations, estimated to cost \$900,000.

Samuel Cohen, 45 West Fifty-seventh Street, New York, architect, has plans for a six-story automobile service and repair building, 100 x 105 ft., for Joseph E. Mantner and associates, to cost approximately \$250,000 with equipment. Bids will be asked in March.

The Remington-Noiseless Typewriter Co., New York, has been organized by officials of the Remington Typewriter Co., 374 Broadway, and the Noiseless Typewriter Co., 253 Broadway, to take over the latter corporation and consolidate with the noiseless typewriter branch of the Remington company, which will continue under its present name. The former Noiseless company will be dissolved. Production will be continued at the present works of the Noiseless organization at Middletown, Conn., which it is proposed to expand. The new company will issue preferred stock for \$1,250,000. Dr. C. W. Colby, heretofore president of the Noiseless company, will be chairman of the board of the new corporation, and B. L. Winchell, president of the Remington Typewriter Co., will act in a like capacity for the Remington-Noiseless company.

The Provincial Government, Alberta, Calgary, Canada, is perfecting plans for a hydroelectric generating plant on site at the Banff National Park, for which application has been made to the Dominion Government. The complete project will provide for a development of 100,000 hp., and is estimated to cost \$7,000,000.

Margon & Glaser, 2806 Third Avenue, New York, architects, have plans in preparation for a two-story automobile service and repair building, 100 x 250 ft., on Brook Avenue, for J. J. Tully, 639 Courtland Avenue, to cost about \$200,000 with equipment.

The American Alum Corporation, 55 Liberty Street, New York, has made application to the Federal Power Commission, Washington, for permission to construct a hydroelectric power plant on the Gila River, vicinity of Silver City, N. M., for service at its properties.

## The Crane Market

**D**EMAND for cranes in the New York district is not particularly heavy, although there are a few small inquiries being quoted on by builders and a few larger ones that have been pending for the past two or three weeks. Among pending awards are the inquiries of the Anaconda Copper Mining Co., 25 Broadway, New York, and the Lehigh Valley Railroad, 143 Liberty Street, New York. While the Lehigh Valley Railroad has closed on its three locomotive cranes, the list of the Baltimore & Ohio Railroad is still open. A 30-ton, 50-ft. boom, steam-operated locomotive crane for the Great Northern Railroad Co., St. Paul, Minn., is still pending. E. H. Morford & Co., Moore Building, Charleston, W. Va., are inquiring for a used locomotive crane, 12 to 20 tons capacity, and a stiff-leg derrick, 55 to 65-ft. boom, to handle a clam-shell bucket.

Among recent purchases are:

Bethlehem Steel Corporation, Bethlehem, Pa., two 10-ton overhead traveling cranes, 80 and 100-ft. spans, for its Bethlehem plant, from the Pawling & Harnischfeger Co.

Atlantic Coast Line, Wilmington, N. C., a 10-ton, 37-ft. span, 10-ton, 67-ft. span, 15-ton, 57-ft. span and 25-ton, 57-ft. span, overhead traveling cranes from an Eastern crane builder.

Lehigh Valley Railroad, 143 Liberty Street, New York, three 30-ton locomotive cranes, with 1½-cu. yd. buckets and steam hammers, for Jersey City, Sayre N. Y., and Buffalo, N. Y., from the Industrial Works.

American Fabricated Steel Co., Philadelphia, two 5-ton, 37-ft. span, 3-motor, overhead traveling cranes from Alfred Box & Co.

Electric Storage Battery Co., Philadelphia, for Crescentville, Pa., a 2-ton, 30-ft. span, 3-motor overhead crane from Alfred Box & Co.

American Foundry & Machine Co., Hamilton Ohio, a 3-ton, 24-ft. span, single I beam crane from the Shepard Electric Crane & Hoist Co.

Hudson Motor Car Co., Detroit, Mich., four 1-ton single I beam cranes from the Shepard Electric Crane & Hoist Co.

Byllesby Engineering Co., Chicago, a special 10-ton electric crane for the Northern States Power Co. from the Whiting Corporation.

United Electric Light & Railway Co., Davenport, Iowa, a 100-ton, 61-ft. 4½ in. span and a 35-ton, 18-ft. span overhead cranes from the Whiting Corporation.

Oliver Iron Mining Co., Duluth, Minn., a 15-ton electric traveling crane from the Whiting Corporation.

J. L. Mott Iron Works, Trenton, N. J., a 5-ton, 41-ft. span electric crane from the Whiting Corporation.

Yonkers Builders' Supply Co., Yonkers, N. Y., a 20-ton locomotive crane from the Browning Co.

Diamond Match Co., Chico, Cal., a 25-ton locomotive crane from the American Hoist & Derrick Co.

Bay Ridge Cement Co., Cleveland Ohio, a 20-ton used industrial locomotive crane from Philip T. King, 30 Church Street, New York.

Hart & Crouse Co., Utica, N. Y., a 23-ton, 45-ft. boom, used McMyler locomotive crane from Philip T. King, 30 Church Street, New York.

Mountain States Power Co., Marshfield, Ore., a 30-ton electric traveling crane from the Whiting Corporation.

Oklahoma Gas & Electric Co., Harrah, Okla., a 5-ton hand-power crane from the Whiting Corporation.

Duffin Iron Works, Chicago, a 10-ton, 80-ft. span, 4-motor, overhead traveling crane from the Milwaukee Electric Crane & Mfg. Co.

Hubbard & Co., Pittsburgh, a 3-ton, 55-ft. span, 3-motor crane from the Northern Engineering Works.

McClintic-Marshall Co., Pittsburgh, 3 7½-ton, 80-ft. span crane for Pottstown from the Shaw Electric Co.

The Anaconda Copper Mining Co., 25 Broadway, New York, is closing negotiations with the Davis-Daly Copper Co. for the purchase of its copper properties in Montana, and other assets, for \$3,000,000. The new owner plans for expansion in the existing works.

Ovens, power equipment, conveying machinery and other equipment will be installed in the addition to be erected by the General Baking Co., 251 Nineteenth Street, Brooklyn, to cost \$95,000, for which plans have been completed.

The Aden Port Trust, Aden, Arabia, will have plans prepared for a municipal electric power plant, to cost in excess of \$250,000, for which bids will be solicited in the near future. Raymond Davis, American Consul, Aden, has information regarding the project.

The South Manchurian Railway Co., Seoul, Korea, has preliminary plans for the construction of a hydroelectric generating plant on the Yalu River, north of Antung, with initial development of 100,000 hp., estimated to cost \$800,000 with machinery.

The Nov-E-Line Mfg. Co., Inc., 302 West Thirty-sixth Street, New York, manufacturer of metal novelties, jewelry, etc., has leased an entire floor in the building at 1650 Broadway for a new plant. The present works will be removed to the new location.

Manual training equipment will be installed in the three-story high school addition to be erected at Roselle, N. J., estimated to cost \$300,000, for which bids will be asked in March. Rasmussen & Wayland, 252 West Forty-sixth Street, New York, are architects.

Fire, Jan. 30, destroyed the plant of the Johnson Products Co., Inc., Garfield, N. J., manufacturer of celluloid specialties, with loss of about \$200,000 including equipment. It is planned to rebuild.

The Draton Investment Co., 50 Freeman Street, Newark, will commence the construction of a one-story ice-manufacturing plant, 100 x 245 ft., at 213 South Eighteenth Street, East Orange, N. J., to cost about \$80,000. Marshall Shoemaker, 15 Central Avenue, Newark, is architect and engineer.

The Wheeler Condenser & Engineering Co., Carteret, N. J., has construction in progress on a one-story foundry, 100 x 245 ft., for the production of iron and brass castings. Contracts for certain equipment have been let, including four 30-ton and four 10-ton traveling cranes. William Lonsdale is general manager.

Fire, Feb. 1, destroyed a portion of the four-story plant of the Florance Brothers Mfg. Co., 31-41 Godwin Street,

Paterson, N. J., manufacturer of sash, doors, etc., with loss estimated at \$200,000 including machinery. It is planned to rebuild.

Plans are being drawn by Henry J. Nurick, 44 Court Street, Brooklyn, architect, for a two-story automobile service and repair building, 200 x 200 ft., on New Street, for a company whose name will be announced later, estimated to cost \$125,000, with equipment.

## Philadelphia

PHILADELPHIA, FEB. 4.

**W**ILLIAM D. HAWKINS and David A. Longacre, trustees for the McCambridge, Egnon & Evans Co., Philadelphia, manufacturer of power plant, plumbing and railroad specialties, have engaged Charles Kriser, president Industrial Plants Corporation, 25 Church Street, New York, to liquidate all the assets of the company. The plant comprises a fully equipped brass foundry, brass-finishing shop, machine shop, plating and polishing shop, all patterns, jigs, tools and fixtures and a large quantity of raw and finished materials. There is also a fully equipped power house and two three-story buildings.

The Sherwood & Sons Casket Co., City Line, Easton, Pa., plans to rebuild its factory destroyed by fire Jan. 25 with a loss of \$60,000.

Work will commence on a one-story power house at the textile mill of William D. Whitaker, Sedgley and N Streets, Philadelphia, in connection with an addition to cost \$100,000. The William Steele & Sons Co., 219 North Broad Street, is the general contractor.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, has awarded contract to the McClintic-Marshall Co., Pittsburgh, for an addition to its plant at Essington, to cost \$150,000.

The Philadelphia Rapid Transit Co., 810 Dauphin Street, Philadelphia, has purchased property at Johnson and Twentieth Streets as a site for a new car shop and barns, for which plans are nearing completion, estimated to cost more than \$250,000.

Bids will soon be asked by Joseph Kopperman & Sons, 309 Florist Street, Philadelphia, manufacturers of copper and bronze products, for a three-story and basement plant at 324-28 New Street, 54 x 85 ft., estimated to cost \$27,000. H. H. Kline, Bulletin Building, is architect.

The H. W. Butterworth & Sons Co., 2417 East York Street, Philadelphia, manufacturer of textile machinery and parts, has acquired the plant of the Greenville Iron Works, Inc., Greenville, S. C., and will remodel for a branch works, taking immediate possession.

Manual-training equipment will be installed in the proposed two-story high school addition to be erected at Church and Wyoming Streets, Hazleton, Pa., estimated to cost \$600,000. Lawrie, Green & Co., 222 Market Street, Harrisburg, Pa., are architects.

The Autodex Co., Waynesboro, Pa., recently organized with a capital of \$50,000, is planning for the establishment of a factory to manufacture patented card-indexing machines. H. E. D. Gray and Roy J. D. Hoover, Waynesboro, head the company.

The Bethlehem Motors Corporation of New York, Allentown, Pa., manufacturer of motor trucks, will dispose of its branch plant at Pottstown, Pa., and consolidate production at the Allentown works, with increased facilities in equipment and floor space. Tentative plans are under advisement for the construction of a new plant at Allentown. Howard B. Hall is president.

The Reber-Korn Co., Allentown, Pa., has been organized to take over and operate the sheet metal and metal roofing business and works of Thomas R. Wasser, 219-21 North Lumber Street, and plan for extensions and improvements. Chauncey C. Reber and C. B. Korn are heads.

The Adams Township Electric Co. and the Croyle Township Electric Co. are being organized by William J. Faux, and J. V. Jahnke, to install and operate power plants and systems in the districts for which named. The companies are represented by Johnson, Gilkyson & Freeman, 1211 Chestnut Street, Philadelphia.

The Pennsylvania Railroad Co., Broad Street Station, Philadelphia, has awarded a general contract to the Armstrong & Latta Co., 1926 Sansom Street, for a one-story machine shop at Camden, N. J., 87 x 150 ft., to cost about \$75,000, to replace a portion of its repair shops recently destroyed by fire.

The Philadelphia Electric Co., Tenth and Chestnut Streets, Philadelphia, is arranging for a new capital stock issue of \$10,000,000, a portion of the proceeds to be used for extensions.

The Mutual Pottery Co., Trenton, N. J., manufacturer of sanitary ware, a subsidiary of the Trenton Potteries Co., has awarded a general contract to the James H. Morris Co., 211 North Montgomery Street, for a one-story addition, to cost approximately \$300,000 with equipment. A 370-ft. tunnel kiln will also be constructed. John A. Campbell is president.

## Buffalo

BUFFALO, Feb. 4.

BIDS will be received by the Board of Trustees, Palmyra, N. Y., until Feb. 21 for extensions in the municipal waterworks, including pumping plant. Hopkins & Field, 349 Cutler Building, Rochester, N. Y., are engineers. Sanford M. Young is village clerk.

The Elba Cold Storage Co., 535 East Ferry Street, Buffalo, Frederick Stevenson, president, has revised plans for its proposed two-story ice and cold storage plant, 100 x 140 ft., at Elba, N. Y., to cost \$125,000, and is asking bids on a general contract. C. K. Porter & Sons, 3 West Eagle Street, Buffalo, are architects; the Industrial Planning Co., 80 West Genesee Street, is engineer.

The Tichener Iron Works, Frederick Street, Binghamton, N. Y., manufacturer of ornamental and architectural iron specialties, has plans for a one-story addition estimated to cost \$55,000 with equipment. R. Z. Spaulding is president.

Bids will be received by the Department of Public Works, Room 5, Municipal Building, Buffalo, until Feb. 15, for 260 6-in., 40 8-in., and 12 16-in. iron body, bronze mounted heavy hub end double gate valves.

The Brown Oil Co., P. O. Box No. 12, Bowmansville, N. Y., is planning the construction of a works to cost about \$60,000 with equipment.

Manual-training equipment will be installed in the new high school to be erected on Pleasant Avenue, Hamburg, N. Y., estimated to cost \$300,000, for which bids will be received on revised plans until Feb. 11. F. A. Spangenberg, 250 Delaware Avenue, Buffalo, is architect.

The F. A. Raven Co., Yerdon Building, Fort Plain, N. Y., is planning for the installation of machinery in a plant to manufacture radio equipment and parts, including automatic screw machine, etc.

The Continental Paper & Bag Mills, Inc., Watertown, N. Y., with branches at Rumford, Me., and other points, is disposing of a bond issue of \$6,000,000, a portion of the pro-

ceeds to be used for extensions. Executive offices are at 16 East Fortieth Street, New York. The company will take over the Rumford, Me., pulp and paper mills of the International Paper Co., New York.

Fire Jan. 21 destroyed the plant and equipment of the Erie Brass & Copper Works, Eighteenth and Washington Streets, Erie, Pa., with a loss of \$300,000. It is planned to rebuild.

Henry & Allen, Auburn, N. Y., are in the market for a No. 14 combination ball-bearing Gardner disk grinder, belt-driven and with complete equipment, including countershaft.

## New England

BOSTON, Feb. 4.

IN the closing days of January and so far this month more inquiry and sales for machine tools are reported, but business is by no means active. The Willys-Morrow Co., Elmira, N. Y., placed \$15,000 worth of broaches and \$25,000 worth of broaching machines and an inquiry for large boring machines comes from a Middle Western steel mill. One local machine tool dealer reports January sales 10 per cent larger than for any month last year, but the trade in general made no such showing. New England machine tool builders view prospects for business the first half of 1924 as more encouraging. Many, however, have heavy stocks of standard tools and parts on hand and are doing more or less outside work in their foundries. In some instances slight reductions in wages of shopmen have been made. For the first time since before the war there is a surplus of machinists in this section.

Small tool business holds up remarkably well, January bookings being in excess of those in December and far ahead of January, 1923. Transmission leather belting is in increasing demand, with some makers operating at 80 per cent of capacity or thereabout.

Inquiries for equipment from New England industries are small. That of the Mead-Morrison Mfg. Co., East Boston, the largest, is still open and a representative of that company will inspect New York, Philadelphia and New Jersey used tool offerings before closing. The Maine Central Railroad inquiry also is open. The Bangor & Aroostook Railroad is inquiring for a single shop tool; the Bethlehem Shipbuilding Corporation, Ltd., Quincy, wants a used 1/2-in. or 3/4 in. McCabe flanging machine for immediate delivery; a Vermont marble cutter is about to close on a large boring mill and a 36-in. shaper. A Beverly, Mass., machinery maker has purchased two new shapers for replacements; a Somerville, Mass., jewelry manufacturer, a new shaper; a consulting engineer of Boston took a high priced lathe, while horizontal boring machines, power presses, various sized lathes, upright drills, high speed hammers and miscellaneous tools, practically all new, have been placed with Massachusetts manufacturers.

Sketches are being made for a two-story, 50 x 150 ft. machine shop at Peabody, Mass., owner's name withheld. Smith & Walker, 80 Boylston Street, Boston, are the architects.

Contract has been awarded by the Mack Motor Truck Co., 185 Massachusetts Avenue, Cambridge, Mass., for a two-story, 150 x 160 ft., sales and service unit with a wing 33 x 160 ft. at North Beacon and Arthur Streets, Brighton, Boston.

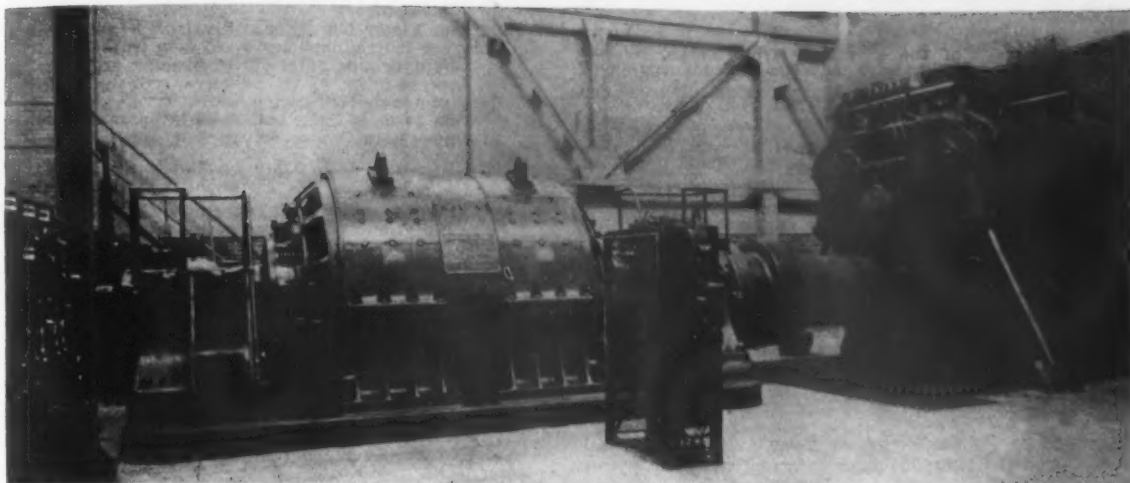
Bids have closed on a proposed generator house extension for the Bristol & Plainville Electric Co., Bristol, Conn. Charles H. Tenney & Co., 200 Devonshire Street, Boston, are the engineers.

Albert Kahn, 1000 Marquette Building, Detroit, is preparing plans for a one-story and basement assembling plant for the Ford Motor Co. at Cambridge, Mass.

Foundations are practically completed for a two-story, 100 x 300 ft., sales and service station on Fairfield Avenue, for Arthur L. Clark, Inc., 1710 Main Street, Bridgeport, Conn. Fletcher & Thompson, 542 Fairfield Avenue, Bridgeport, are the architects.

Fire last week destroyed the pattern and machine shops and storage units of L. H. Goodnow, Crocker Street, Fitchburg, Mass., foundry at an estimated loss of \$35,000. Rebuilding will begin as soon as possible.

The New England Iron Works, Summer Street Extension, Boston, has awarded a contract to Thomas Mulcare, 1 Exeter Park, Cambridge, for an addition to its plant, with improvements in present works, 130 x 180 ft.



This Double Unit Reversing Direct-Current Motor Was Built by the General Electric Co., to Drive a 30-In. Reversing Skelp Mill of the Youngstown Sheet & Tube Co., Youngstown, Ohio. It is of 4000 hp., designed for a maximum temperature rise of 50 deg. centigrade (90 deg. Fahr.) and for operation at from 80 to 135 r.p.m. The pinion stand, of unusually heavy construction, is, contrary to general practice, in the motor room rather than outside in the mill room

Charles E. Lowell, Whitman, Mass., formerly identified with the Boston Last Co., South Avenue, and associates have formed the Boston Electric Heating Co., with capital of 1000 shares of stock, no par value, to operate a local plant for the manufacture of electric appliances for shoe factories. Fred Drew, Brockton Last Co., heretofore mentioned in connection with the purchase of the Boston Last property, will not be interested in the new company, of which Mr. Lowell is president and Donald B. Heath general manager.

The H. L. Goodnow Foundry Co., Fitchburg, Mass., has tentative plans for rebuilding the portion of its foundry and pattern shop destroyed by fire, Jan. 27, with loss estimated at \$40,000 including equipment.

Fire, Feb. 1, destroyed a portion of the brake lining manufacturing plant of the Russell Mfg. Co., Middletown, Conn., with loss estimated at \$100,000 including mechanical drying and other machinery. It is planned to rebuild.

The Montaup Electric Co., Inc., Fall River, Mass., is completing plans for its proposed steam-operated electric generating plant at Somerset, Mass., comprising a one-story turbine department, 135 x 165 ft.; steam boiler department, 135 x 165 ft., with electric power section adjoining, 30 x 100 ft.; and office building, 26 x 60 ft. It will cost about \$5,750,000 including machinery. Stone & Webster, Inc., 147 Milk Street, Boston, is engineer and contractor.

The Bureau of Supplies and Accounts, Navy Department, Washington, will take bids until Feb. 19 for 24 electric heaters for the Portsmouth, N. H., Navy Yard, schedule 1857.

The State Highway Department, Hartford, Conn., will build a steam power plant at its automobile and equipment depot, Portland, Conn., with coal-handling and storage facilities. Negotiations are in progress between the Department and the State Board of Education for the establishment of a trade school at the Portland buildings for instruction in automobile and tractor parts production, repairs, etc. Frederick J. Trinder, State director of vocational education, is in charge.

## Detroit

DETROIT, Feb. 4.

PLANS have been filed by the Cadillac Motor Car Co., 2860 Clark Avenue, Detroit, for two one-story foundry additions, to cost \$235,000 and \$225,000, respectively. A reclaiming building will also be constructed. Work is in progress on a pattern-making shop.

The Detroit De Luxe Co., 3408 Lincoln Avenue, Detroit, plans for the installation of a cylinder grinder and other tools.

The General Engineering & Management Corporation, 141 Broadway, New York, is concluding negotiations for the purchase of the Boyne River Power Co., Boyne City, Mich. The property will be merged with other utility interests of the purchasing company in this section, and extensions made in the power plant and system.

The T. & R. Collins Trucking Co., 804 Hoffman Building, Detroit, is taking bids for a one and two-story automobile

service and repair shop, 60 x 115 ft., estimated to cost \$50,000. Arthur Des Rosiers, 620 McKerchey Building, is engineer.

The Unique Brass Co., Jefferson Street, near Morrell Street, Detroit, has awarded a general contract to the Everett-Hunter Co., Book Building, for a one and two-story addition, estimated to cost \$50,000.

The Bassick Mfg. Co., 361 West Superior Street, Chicago, manufacturer of lubricating devices and materials for automobiles has acquired a controlling interest in E. S. Evans & Co., Dime Bank Building, Detroit, manufacturer of loading devices, and plans for expansion. E. W. Bassick will be chairman of the board, and E. S. Evans, president and general manager.

Ovens, power equipment, conveying machinery, etc., will be installed in the two-story plant, 60 x 120 ft., to be erected by the Consolidated Bakery, 2124 McClellan Avenue, Detroit, at Amity Street and McClellan Avenue, estimated to cost \$50,000. P. R. Pereira, Lincoln Building, is architect. B. Alexander is manager.

The Lake Superior District Power Co., Ironwood, Mich., has acquired the electric generating plant of M. A. Hanna & Co., at Wakefield, Mich., heretofore operated under lease. The plant has a present rating of 1200 kw. and extensions are planned, with additional equipment.

The John W. Ladd Co., 2016 West Lafayette Street, Detroit, manufacturer of dairy machinery, is having plans drawn for an addition on West Jefferson Street. Esselstyn & Murphy, 810 Marquette Building, are engineers.

## St. Louis

ST. LOUIS, FEB. 4.

PRELIMINARY plans are being considered by the Todd Demountable Rim Mfg. & Sales Co., Windsor Place, Moberly, Mo., J. W. Lynch, head, for a two-story plant, 30 x 100 ft., to manufacture metal rims, estimated to cost \$80,000 with equipment.

A. F. Seested, 3271 Main Street, Kansas City, Mo., will commence the construction of a three-story automobile service and repair building, 65 x 250 ft., on Twenty-fourth Street, estimated to cost \$125,000 with equipment. J. G. Braecklein, Federal Reserve Life Insurance Building, Kansas City, Kan., is architect.

The Grand River Hydro Electric Co., Wagoner, Okla., will commence the construction of a power dam and hydro-electric generating plant on the Grand River, estimated to cost \$500,000 with equipment.

The City Council, Fredonia, Kan., has plans for the construction of a municipal electric power plant and system, and for the electrification of the waterworks, estimated to cost \$150,000, for which bonds have been voted. Arthur L. Mullergren, Gates Building, Kansas City, Mo., is engineer.

Manual training equipment will be installed in the two-story and basement high school to be erected at Albany, Mo., estimated to cost \$110,000, for which bids have been asked on a general contract. H. D. Pampel, 702 Finance Building, Kansas City, Mo., is architect.

The Pittsburg Boiler & Machine Co., Pittsburg, Kan.,

is inquiring for a 10½ or 12½ ft. pneumatic riveter for driving up to 1-in. steam-tight rivets.

W. A. Sorg, care of the Chamber of Commerce, Okmulgee, Okla., has tentative plans under way for the construction of a four-story plant to manufacture gas and gasoline engines and parts, estimated to cost \$55,000.

The Dean Rubber Co., 561 Grand Avenue, Kansas City, Mo., has awarded a general contract to the Bickel Co., A. & R. Building, for its two-story and basement plant, 100 x 100 ft., estimated to cost \$80,000, for the manufacture of rubber tires and other products. W. J. Dean is president.

Manual training equipment will be installed in the high school to be erected at Spiro, Okla., estimated to cost \$100,000, for which foundations will be laid at once. Klingensmith, Haralson & Nelson, Fort Smith, Ark., are architects.

The Board of Improvement, Althelmer, Ark., plans the installation of electrically operated pumping machinery in connection with waterworks expansion, estimated to cost \$25,000.

The Board of Public Works, St. Joseph, Mo., will install electrically operated pumping machinery and auxiliary equipment, in connection with proposed extensions in the municipal waterworks, to cost \$600,000. W. K. Seitz is engineer in charge.

The Empire Refining Co., Ponca City, Okla., has tentative plans for a new oil refinery to cost \$225,000.

## Chicago

CHICAGO, Feb. 4.

**P**ROSPECTIVE railroad buying is the feature of interest. The Santa Fe has put out additional inquiries for 33 machines, making a total of 52 on which it has thus far asked for prices, including the 19 published on page 401 of our issue of Jan. 31. The Chicago, Milwaukee & St. Paul has issued a list of 44 machines in connection with which it has asked for prices on used or rebuilt equipment whenever possible.

The most important development in the industrial field was the purchase of the Mitchell Motors Co. plant at Racine by the Nash Motors Co. Only the buildings were bought, all of the equipment having been disposed of previously. No announcement has yet been made as to what department of the Nash organization will be housed in the Racine works, but it is apparent that much new equipment must be bought. The A. C. Smith Corporation, Milwaukee, is reported to have purchased a few machines and is likely to close against its entire pending list within the next few weeks. Current sales of machine tools have been largely confined to single machines. Local merchants are figuring on much business, but prospective buyers are slow in placing orders.

### Additions to Santa Fe List

One Marvel No. 2, or equivalent, draw cut hack saw with capacity up to 6 x 6 in.

One Draper, or equivalent, single pneumatic flue welding machine for superheater tubes 2 to 5½ in. inclusive.

One belt-driven swedging machine for swedging ends of locomotive flues after welding, capacity 2 to 5½ in. inclusive.

One Niles motor-driven locomotive axle journal turning machine.

One 4000-lb. double frame steam hammer.

One Foote-Burt No. 17, or equivalent, two-spindle independent feed motor-driven drill.

One motor-driven Barnes, or equivalent, 24-in. sensitive drill.

One Baker Brothers No. 417, or equivalent, motor-driven heavy duty vertical drill.

Five Barnes, or equivalent, motor-driven 20-in. upright sensitive drills.

Two 6-ft. American, or equivalent, triple-purpose motor-driven radial drills with gear box drive.

One motor-driven 7-ft. triple-gear full universal radial drill, with alternates on 5 and 6-ft. machines and also on plain radial drills.

One motor-driven 30-in. upright drilling and tapping machine.

One No. 3 Brown & Sharpe, or equivalent, 12 x 40-in. universal belt-driven grinder.

One Yankee Style WJF, or equivalent, drill grinder, capacity ¼ to 3½ in.

One 36-in. x 16-ft. heavy duty motor-driven triple-gear lathe.

Four 20-in. x 8-ft. motor-driven heavy duty geared head lathes.

One No. 2 J. N. La Pointe broaching machine, or equivalent.

One Victor No. 2, or equivalent, belt-driven nut facing machine, capacity ¼ to 3 in.

One hydraulic hand power bushing press.

One 24-in. x 14-ft. selective type head heavy-duty motor-driven engine lathe.

One 24-in. x 16-ft. tool room lathe, motor-driven.

One 4½-in. motor-driven full automatic turret lathe.

One 48-in. x 16-ft. triple geared heavy-duty motor-driven lathe.

Two hot saw and tube expanding machines, belt-driven, one with capacity up to 3-in., the other for 3½- to 5½-in. tubes.

### Chicago, Milwaukee & St. Paul List (used or rebuilt equipment desired)

One 24-in. x 10-ft. belt-driven engine lathe.

One 24-in. x 16-ft. belt-driven engine lathe.

One 24-in. x 8-ft. handy tool-room lathe, motor drive.

One 24-in. x 12-ft. motor-driven engine lathe.

One 24-in. x 10-ft. motor-driven engine lathe.

One 42-in. x 16-ft. belt-driven engine lathe.

One No. 2A Warner & Swasey motor-driven turret lathe.

One 2 x 24-in. Jones & Lamson motor-driven turret lathe.

One 3 x 36-in. Warner & Swasey turret lathe.

Four belt-driven 32-in. crank shapers.

Two motor-driven 32-in. crank shapers.

Two motor-driven 44-in. boring mills.

One 36-in. motor-driven Bullard vertical turret lathe.

One 42-in. motor-driven Bullard vertical turret lathe.

One 26-in. motor-driven crank planer.

Six belt-driven 42-in. heavy duty vertical drill presses.

One belt-driven 44-in. heavy duty vertical drill press.

One belt-driven 36-in. vertical drill press.

Two motor-driven 5-ft. radial drills.

One motor-driven 6-ft. radial drill.

Two motor-driven heavy duty 4-spindle drill presses with 8-ft. beds.

Two motor-driven 36-in. double-end punches and shears.

One motor-driven 36-in. single-end punch and shear.

One ¾-in. belt-driven McCabe flanger.

One 1500-lb. steam hammer.

Two 1100-lb. steam hammers.

One 8-ft. power shear.

One 10-ft. cornice brake.

One 36-in. Morton draw cut shaper.

One power hack saw.

The National Brake & Electric Co., Milwaukee, has closed for a 4-ft. radial drill and a milling machine. The Jenkins Machine Co., Sheboygan, Wis., has ordered a 36-in. x 36-in. x 12-ft. planer with four heads.

The Whiting Corporation, Harvey, Ill., has booked the following orders for foundry equipment: 2 24 x 36-in. tumbling barrels for the Ypsilanti Foundry, Ypsilanti, Mich.; 1 No. 7 cupola for the J. L. Mott Iron Works, Trenton, N. J.

The Peters Machinery Co., 231 West Illinois Street, Chicago, is having plans prepared by C. A. Eckstrom, 5 North LaSalle Street, for a one-story factory, 91 x 144 ft., at 4700 West Ravenswood Avenue, to cost \$40,000.

The Gustafson & Sedl Mfg. Co., 1637-47 Lowell Avenue, Chicago, has had plans drawn by C. E. Frazier, 30 North Dearborn Street, Chicago, for a one-story factory, 125 x 125 ft., to cost \$40,000.

The Vaughan Novelty Co., 3211-21 Carroll Avenue, Chicago, has awarded a contract for a one-story plant, 46 x 50 ft., to cost \$7,000.

The Simplex Mfg. Co., 629 Cass Street, Joliet, Ill., manufacturer of stoves, furnaces and boilers, has increased its capital stock from \$20,000 to \$100,000. The company was organized about five months ago and specializes in the manufacture of oil burners for furnaces. The president is Frank Streich and the secretary, Howard P. Gleissner.

The Ball-Stewart Co., manufacturer of poultry feeding and cold storage equipment, Clinton, Iowa, has purchased property between Thirteenth and Fourteenth Avenues as a site for a new plant.

The Elmhurst Steel & Stamping Co., Elmhurst, Ill., recently incorporated with \$100,000 capital stock, will do a general line of metal stamping work and will also manufacture tools, dies and jigs. It is likewise equipped to do spot welding, japanning, enamelling, etc., and has a plant, 40 x 150 ft., which is completely equipped. The company succeeds a partnership which was formed about a year ago. Officers are: President, H. P. Steinbrenner; vice-president, H. G. Steinbrenner; and secretary-treasurer, J. L. Stewart.

The Metal Tube Mfg. Co., 723-5 Fulton Street, Chicago, recently incorporated with \$15,000 capital stock, as the successor of the Metal Tube & Specialties Co., manufactures brass, copper and steel tubing, particularly for automobile

purposes, and makes automobile radiator machinery, special machinery, dies and tools. The plant is equipped and the officers are: President, Charles F. Sperry; treasurer, Ernest C. Kuehl, and secretary, Joseph H. Sperry.

The Perfection Timing Gear Co., 213 North Morgan Street, Chicago, recently incorporated with \$40,000 capital stock, has leased a plant and manufactures silent timing gears and silent industrial gears. The company has been a going concern for some time, although it had not been incorporated. Officers are: President, David H. Daskal; secretary, George H. Daskal, and treasurer, David Davis.

The Electric Apparatus Co., 127 South Green Street, Chicago, has leased a four-story and basement factory containing 37,500 sq. ft. of floor space, at the southwest corner of Halsted and Superior Streets. The owner will expend \$15,000 remodeling the structure. The electric company will occupy the first three floors and the two top floors will be sublet.

The Common Council, Willmar, Minn., has authorized plans for a municipal electric power plant, estimated to cost \$110,000, and will take bids at an early date. Toltz, King & Day, Pioneer Building, St. Paul, Minn., are engineers.

The Minnehaha Welding & Machine Co., 3750 Minnehaha Avenue, Minneapolis, has tentative plans for a two-story addition, 40 x 150 ft., to be used primarily as a machine shop, estimated to cost \$40,000. E. M. Brass is one of the heads of the company.

The Cutler-Proctor Stove Co., Peoria, Ill., will commence the erection of a four-story addition on North Water Street, 150 x 200 ft., estimated to cost \$150,000, including equipment. It will replace the portion of the plant recently destroyed by fire.

The Greenfield Light & Power Co., Greenfield, Iowa, is considering the construction of a one-story addition to its steam-operated electric power plant, estimated to cost \$50,000.

## Cincinnati

CINCINNATI, Feb. 4.

**M**ACHINE tool manufacturers are encouraged with the number of orders booked during January. The month started off exceptionally well for the first week or two, but later a falling off was noted. During the last week, however, buying was resumed in lots of one and two tools. The General Electric Co. bought for its West Philadelphia plant, placing orders for radials, drilling machines and milling machines. The Buick Motor Car Co. also was a purchaser, a local manufacturer having received an order for five crankshaft lathes. The Ford Motor Co. bought a planer and a special machine. Railroad buying was confined to single tools for filling in purposes. General industrial buying continues the feature and indications point to a large volume of orders, with inquiries in good number.

The Norfolk & Western Railroad will build a machine shop, pipe shop and tin shop at Portsmouth, Ohio, and has asked for bids on a one-story steel frame structure. A list of tools is expected to be issued shortly.

The Merkel Brothers Co., Cincinnati, wholesale plumbing supplies, will shortly award contract for a new building to house its business. A large pipe shop will be built, in which an electric traveling crane and pipe cutting equipment will be installed.

The Kentucky & Indiana Terminal Railways Co., Louisville, Ky., is planning the installation of additional machine tool equipment in its shop.

The Wabash Portland Cement Co., Detroit, has purchased property in Greene Co., near Xenia, Ohio, and it is said will shortly commence the erection of a plant.

Ground has been broken at Old Hickory, Nashville, Tenn., for a \$1,000,000 plant for the Old Hickory Paper Co., recently organized with John I. Beggs of Milwaukee, president. Bids are being taken for the general construction and steel work. Most of the machinery orders have been placed.

The Clinch-Locust Garage Co., Knoxville, Tenn., has awarded contract for the construction of a 100 x 250 ft. garage and service station on Locust Avenue, estimated to cost \$75,000. Machine shop and conveying equipment will be installed.

Electric pumping machinery and other equipment will be required for the additions contemplated at the waterworks and system at Lewisburg, Tenn., estimated to cost \$150,000, for which the Common Council is in charge.

Electrical pumping and auxiliary equipment will be purchased and installed in new waterworks to be constructed at Coal Creek, Tenn., estimated to cost \$30,000. The City Council is in charge.

O. W. Thomas, Nashville, Tenn., will commence the erection of a garage and service station at Eighth and Wedgewood Avenues, Nashville, and will install machinery and transmission and conveying equipment.

The United States Engineer's Office, Cincinnati, will take bids until Feb. 11 for one watertube boiler, circular 2444.

The Fostoria Ice & Coal Co., Fostoria, Ohio, has preliminary plans for a new artificial ice-manufacturing plant at Findlay, Ohio, estimated to cost \$55,000. K. B. Clore is in charge.

Edward Gunn and Frank Bell, Springfield, Tenn., are formulating plans for the organization of a company to construct and operate a power plant on the Red River, near Keysburg, Tenn., estimated to cost \$100,000.

Manual training equipment will be installed in the proposed high school to be constructed at Frankfort, Ky., to cost about \$150,000, for which a site has just been purchased at Shelby and Fourth Streets. Frankel & Curtis, Lexington, Ky., are architects.

The Tennessee Enameling Co., Charl Park, Nashville, Tenn., has awarded a general contract to G. B. Howard & Co., Fourth Avenue, North, for a one-story plant, 100 x 180 ft., at Park Avenue and Forty-first Street, to cost \$65,000. It will replace a works recently destroyed by fire. M. H. Wright is president.

The Mills Equipment Co., Chattanooga, Tenn., machinery dealer, has inquiries out for a high-lift steam shovel, mounted on crawlers.

The Common Council, Morganfield, Ky., plans the installation of electric-operated pumping machinery in connection with extensions in the municipal waterworks, estimated to cost \$120,000.

Manual training equipment will be installed in the two-story high school to be erected at Dayton, Ky., estimated to cost \$115,000, for which plans are being drawn by C. C. and E. A. Weber, Ingalls Building, Cincinnati, architects.

## Cleveland

CLEVELAND, Feb. 4.

**M**ACHINE tool business continues fairly active and January sales as a whole were satisfactory. Considerable inquiry is pending and manufacturers as a rule look for fully as much business in February as during last month. There is a good demand for automatic screw machines in small lots and some round lots are in prospect. Turret lathes continue to move well although orders are mostly for single machines. One local manufacturer of drilling machinery is sold up for about four months and reports that January sales equal production with full operation.

The machine tool demand is fairly well scattered, although the heaviest buying is by the automotive industry. Some additional business was placed during the week by the Ford Motor Co. and by other Detroit car builders. The Timken Roller Bearing Co., Canton, purchased six lathes and is in the market for about a half-dozen additional machines. Several orders for gear grinding machines have come recently from Germany.

The demand for good used machinery is active. About 200 machines in the plant of the Aultman & Taylor Machinery Co., Mansfield, Ohio, whose business was recently sold to the Advance-Rumely Co., are being placed on the market.

Electrical equipment is selling well. Several inquiries are pending for large power units, including one from the McKinney Steel Co. for a 10,000 kw. unit to take care of additional power requirements at its Cleveland steel plant.

Inquiry for locomotive cranes is active. Three or four railroads now have inquiries out aggregating over 20 locomotive cranes. An inquiry is also pending from a steel company for a large ore handling bridge.

The C. & G. Cooper Co., Mt. Vernon, Ohio, will build a 60 x 100 ft. factory extension for assembling engines. It will be provided with a heavy crane run-way and two 10-ton electric traveling cranes will be installed. Contract for the building has been placed with the H. K. Ferguson Co., Cleveland.

The F. A. Coleman Co., Cleveland, has taken the order

for a car type mold oven and two electric rolling drawer ovens for the Industrial Steel Castings Co., Toledo, Ohio.

The Bowler Foundry Co., 1688 Columbus Road, Cleveland, contemplates the erection of a new foundry on Newburgh Street along the tracks of the Newburgh and South Shore Railroad. Definite plans have not yet been prepared.

The H. K. Ferguson Co., Cleveland, has taken a contract for a foundry building, 62 x 195 ft. for the Wickham Piano Plate Co., Springfield, Ohio.

The city of Conneaut, Ohio, is having plans prepared for a \$100,000 filtration plant. Burgess and Niple, 223 East Broad Street, Columbus, Ohio, are the engineers.

The city of Ashtabula, Ohio, will close bids about Feb. 15 for a sewage treatment plant. C. R. Stanhope, City Hall, Ashtabula, is the engineer.

The Board of County Commissioners of Summit County, Akron, Ohio, will take bids about March 1 for a pumping station, including a duplex electric pump with capacity of 500 gal. per min. and for water mains and 2000 hydrants. Barstow & McCarty, Ohio Building, Akron, are the engineers.

The National Ice Co., Fifth and Naghton Streets, Columbus, Ohio, has completed plans for a one-story ice-manufacturing and refrigerating plant at Michigan Avenue and Cherry Street, Toledo, Ohio, to cost approximately \$250,000, with equipment. George Bright, 103 Marquette Building, Detroit, is mechanical engineer. George H. Kittredge, president.

## Indiana

INDIANAPOLIS, FEB. 4.

**T**HE Faucett-Van Meter Chair Co., Bloomfield, Ind., is perfecting plans for rebuilding the portion of its plant recently destroyed by fire. The new factory is estimated to cost \$100,000 with machinery.

The Haywood Motor Sales Co., Bloomfield, Ind., has preliminary plans for a one and two-story service and repair building, 100 x 135 ft., and will take bids in the near future.

The A. L. Maxville Co., Second and Vine Streets, Evansville, Ind., operating an automobile service and repair works, will commence the erection of a three-story addition, 50 x 150 ft., estimated to cost \$50,000, exclusive of equipment.

The Showers Brothers Furniture Co., Bloomington, Ind., has arranged an appropriation of \$1,000,000 for extensions and has asked permission to close a number of streets to allow the expansion. One-half of the fund will be used for a steam-operated electric power plant and the other half for a new chair manufacturing plant. It is expected to complete both structures during the summer.

The Standard Oil Co. of Indiana, Indianapolis, is planning for the installation of a number of tools at its shops at Whiting, Ind., including radial drills, drill presses, planer, etc.

The Southern Railway Co., Southern Railway Building, Cincinnati, is planning the construction of a one-story planing mill and woodworking plant at Princeton, Ind., 85 x 250 ft., to cost about \$70,000. The engineering department is in charge.

The Indiana Electric Corporation, Indianapolis, has plans for the following extensions: addition to power substation, Wabash River, to cost \$592,000 with equipment; Addition to power substation at Indianapolis, \$375,000; extensions in indoor and outdoor distributing substations, Indianapolis, with equipment, \$811,000.

The Baur Tack Co. and the Baur Bale Tie Co., Indianapolis, recently incorporated and under joint management, will purchase equipment as follows: 2 staple machines, 6 wire tack machines, 3 capping machines and 20 Perkins tack machines. Later on about 80 Perkins machines will be purchased. Oscar Baur is president.

The plant of the National Fireproofing Co., Hobart, Ind., was destroyed by fire Jan. 25, with a loss of \$75,000. It is planned to rebuild.

Electrical pumping machinery and other equipment will be required in the new sewer system and disposal plant contemplated at Winona Lake, Ind. Stanley Palmer, Fort Wayne, Ind., is the engineer in charge.

The Chandler Sales & Service Co. has been incorporated at South Bend, Ind., and plans the installation of garage and service station equipment, including press, drill, rebor-ing machine, etc. R. M. Schimmel, 343 Lincoln Way, is the head of the company.

The Dudlo Mfg. Co., manufacturer of automobile coils, radio apparatus, etc., Ft. Wayne, Ind. has work under way on a two-story addition and will install some new equipment, including enameling and winding machines.

Manual training and vocational equipment will be in-

stalled in the new school to be erected at Plainville, near Washington, Ind., estimated to cost \$65,000, for which the Board of School Trustees is in charge.

Manual training and vocational equipment will be installed in the new high and elementary school to be erected in Warren Township, St. Joseph, Ind. Elmer Whitesel, school trustee Warren Township is in charge.

Printing presses, woodworking machinery and machine shop equipment will be installed in the new buildings under construction and contemplated at the Indiana State Reformatory, Pendleton, Ind. Additions are estimated to cost \$500,000 for which Herbert Foltz, Indianapolis, is the architect.

Fire, Feb. 1, damaged the manufacturing plant of J. D. Adams & Co., 217 South Belmont Avenue, Indianapolis, manufacturer of road building machinery, with a loss estimated as more than \$100,000. A new plant will be constructed at once.

The Indianapolis Heat & Light Co., Indianapolis, is planning extensions and power development work for the year which will total approximately \$1,500,000. A 19,000-kw. generator will be installed at the Kentucky avenue station and high pressure boilers at both the Kentucky Avenue and the Mill Street stations. Other plans will be announced later. C. C. Perry is president of the company.

## Pittsburgh

PITTSBURGH, FEB. 4.

**T**HE first month of the new year was dull in point of machine tool sales in this district, notwithstanding that the volume of inquiry was the heaviest in several years. Inquiry still is active and is of such an encouraging character that the trade still is hopeful about the future. Wood-working tools have been in brisk demand lately.

Prices are firm and the maker of one line of high grade drills has in the past week announced an advance of 5 per cent.

The crane market has been somewhat quieter during the week. Much business is pending, but there has been a decrease in the number of new inquiries.

The Lehigh Coal & Navigation Co. has awarded contract to the McClintic-Marshall Co., Pittsburgh for a new concrete and steel coal breaker plant at Lansford, Pa., estimated to cost \$1,000,000. Considerable coal handling machinery and transmission and conveying equipment will be installed. Samuel D. Warriner is president of the company.

The Guyan Machine Shops, Logan, W. Va., machinery dealers, are in the market for an engine lathe, 20 in. x 20 ft., with quick change gears and taper attachment, motor driven or single belt drive; for a tire press for truck tires, about 250 tons capacity; an armature for a d.c. generator, Allis-Chalmers type, 27½ kw., 240-250 volts, 1200 r.p.m.; an electric welder, three-phase, 220 volts; and for one hydraulic wheel press, capacity 200 tons or larger.

Manual training equipment will be installed in the new junior high school to be erected on Sheridan Avenue, Johnstown, Pa., estimated to cost \$450,000, for which bids will soon be asked on a general contract. J. E. Adams, Nemo Building, is architect.

The Buffalo Slag Co., Ellicott Square, Buffalo, has acquired property near DuBois, Pa., for the erection of a new plant for the production of crushed and screened blast furnace slag. A power house is planned. It is proposed to commence work early in April.

The Virginian Rubber Co., Highlawn, Charleston, W. Va., is planning to take machinery bids early in April for its proposed plant, to replace a mill recently destroyed by fire with loss approximating \$400,000. All details will be handled by G. C. Hedrick, Beckley, W. Va., president and general manager.

The Dauser Mfg. & Supply Co., Weston, W. Va., manufacturer of oil well equipment, stove moldings, etc., has tentative plans for a one-story addition, estimated to cost \$50,000 with machinery.

The National Metal Molding Co., Fulton Building, Pittsburgh, manufacturer of electrical equipment, etc., has tentative plans for a one-story addition to its plant at Ambridge, Pa., 130 x 400 ft. It is proposed to build on a day-labor basis.

The Monarch Coal Co., Bluefield, W. Va., recently organized with a capital of \$400,000 to take over the properties of the New Pocahontas Coal Co., McDowell County, W. Va., has tentative plans for the installation of electric power and other equipment at the mines. J. Elwood Jones is one of the heads of the company, which will be affiliated with the Pocahontas Fuel Co.

The Keystone Power Corporation, Ridgway, Pa., is dis-

posing of a bond issue of \$600,000, a portion of the proceeds to be used for extensions in plant and system. J. George Kaelber is president.

The National Window Glass Mfg. Co., Huntington, W. Va., care of the Huntington Chamber of Commerce, has acquired a building for the establishment of a plant to manufacture hand-blown glassware, to give employment to about 300. T. J. Hennessy is general manager.

The Virginian Power Co., Charleston, W. Va., is disposing of a bond issue of \$5,000,000, a portion of the proceeds to be used for the purchase of electric properties at Portsmouth, Ohio, for light and power service, and for proposed extensions and additional equipment. R. E. Burger is vice-president.

## Milwaukee

MILWAUKEE, Feb. 4.

**I**NQUIRY is increasing steadily in the machine-tool trade, with purchases still largely of a routine character and confined principally to single items. Some fair-sized lots are in the foreground, one of largest prospective purchases being that which the Nash Motors Co. will make to equip the former plant of the Mitchell Motors Co. at Racine, Wis., which it has acquired. Practically all of the machinery was disposed of by the Mitchell trustee before the buildings and real estate were offered as a separate parcel.

Employment in the metal trades group in Milwaukee county has advanced throughout January and the number at work exceeds that on either Dec. 1 and Nov. 1, 1923.

The Northern Conveyor & Mfg. Co., 3204 Auer Avenue, Milwaukee, has increased its capital stock from \$50,000 to \$100,000 and contemplates the extension of plant and capacity early in the spring. J. B. Whitnall is president.

The Village Board of Athens, Marathon County, Wis., will take bids shortly after March 1 for the construction of a 50,000-gal. steel tank mounted on a 100-ft. steel tower, for its new municipal waterworks system.

The Otto Biefeld Co., Watertown, Wis., conducting a fabricating shop, boiler works and general machine shop, has acquired a site and will soon select an architect to design a new brick and steel shop group estimated to cost about \$125,000 complete. The present works at 202 North Water Street, have been outgrown.

The Nash Motor Co., Kenosha and Milwaukee, was the successful bidder at \$405,000 for the real estate and buildings of the defunct Mitchell Motors Co. at Racine, Wis., at the trustee's sale Jan. 23. The property consists of 30 acres, modern concrete buildings with 630,000 sq. ft. of floor space and a three-story office building. The appraised value is \$1,013,000. Nash engineers are making a survey, pending the completion of which the new owner will withhold official announcement of prospective use of the plant, although it is intimated by Charles W. Nash, president and general manager, that the intention is to re-equip the shops immediately for quantity production of automobiles. As the trustee previously disposed of virtually all machinery, tools and other equipment at public and private sales, it means that the Nash company will purchase a large list of new equipment.

The Hupp Motor Co., Detroit, Mich., which entered a bid of \$400,000 for the Mitchell plant, but was outbid by the Nash interests, has been offered gratis a tract of 45 acres on the Milwaukee road main line, near Lathrop Avenue, in Racine, by local realtors, provided it will build a plant costing not less than \$400,000, within a specified period. The Hupp company owns the H. & M. Body Corporation of Racine, having acquired the Mitchell company's half interest a year and a half ago. The H. & M. plant builds all of the enclosed bodies for the Hupp company, and as passenger car production is now largely of enclosed body types, it is believed that the offer will merit favorable consideration. Mortimer E. Walker, Racine attorney, represented the Hupp company at the sale of Mitchell real estate and buildings.

The Standard Sheet Metal Works, 1485 Thirtieth Street, Milwaukee, which specializes in the production of portable sheet metal garages and other buildings, has plans for a new factory at Thirtieth Street and Concordia Avenue, which will enable it to treble its present output. The capital stock has been increased from \$30,000 to \$75,000 to finance the improvement program. Jacob Schaffner is vice-president and treasurer.

The Kools Mfg. Co., Appleton, Wis., manufacturer of automatic vegetable peeling and dish-washing machines, decided at the annual meeting to lease additional space in the former Reliance Motor Truck Co. plant, and install more

machinery, extending production to include a smaller type of its machine for home use. William Kools is president and general manager.

Peterson Brothers, 555 Temple Court, Minneapolis, are lowest bidders at \$162,300 for the general contract on the proposed new high and vocational training school at Lancaster, Wis. The architects are Parkinson & Dockendorff, LaCrosse, Wis.

## Pacific Coast

SAN FRANCISCO, JAN. 30.

**C**ONTRACT has been let by the Standard Welding & Mfg. Co., 1146 South Los Angeles Street, Los Angeles, to the Alexander Construction Co., Huntington Park, Cal., for a one-story plant, 50 x 110 ft. Stromwell & Halperin, 1007 South Grand Avenue, are architects.

The Board of Trustees, Union High School District, Hanford, Cal., is taking bids on a general contract for the erection of a vocational shop building at the high school, estimated to cost \$35,000. Coates & Traver, Rowell Building, Fresno, Cal., are architects.

The Wyatt & Miller Lumber Co., Blaine, Wash., recently organized with a capital of \$150,000, has plans for the construction of a local mill and power house to cost close to \$100,000. Plans will be in charge of C. L. Flynn, president of the Bellingham Stevedoring Co., Bellingham, Wash.

The San Joaquin Valley Portland Cement Co., Exeter, Cal., will commence the construction of its mill at Three Rivers, near Exeter, estimated to cost \$1,000,000. The initial units will include a power house. A railroad will be constructed from the plant to Terminus Beach, for connection with the Visalia Electric Railway, 8 miles, to cost \$135,000. A. S. Parker and G. F. Hamburg head the company, which is affiliated with the Old Mission Portland Cement Co., 608 Crocker Building, San Francisco.

The Oregon Lumber Co., Hood River, Ore., has tentative plans for a hydro-electric power development on the East Fork of the Hood River, estimated to cost \$50,000.

The Wilshire Garage Corporation, Los Angeles, will commence the construction of a four-story automobile service and repair building, 150 x 150 ft., at Sixth Street and Kenmore Avenue, estimated to cost \$275,000 with equipment.

H. Neilson, Salt Lake City, Utah, care of L. C. Neilson, McIntyre Building, architect, is having plans prepared for a one-story plant for the manufacture of wireless equipment and devices, estimated to cost \$50,000 with machinery.

The California Packing Co., 101 California Street, San Francisco, plans the construction of an ice-manufacturing and cold storage plant at its proposed canning factory on Sixteenth to Eighteenth Streets, Sacramento, Cal., estimated to cost \$1,000,000 with equipment. A power house will also be built. Philip L. Bush, 101 California Street, is engineer.

The Azusa Water Co., Azusa, Cal., is planning for the installation of electric-operated pumping machinery in connection with proposed extensions to its system to cost about \$100,000.

## Gulf States

BIRMINGHAM, FEB. 4.

**T**HE Decatur Cornice & Roofing Co., Inc., Albany, Ala., is in the market for an air compressor, single or double stage, with minimum capacity of 400 cu. ft. per min. Henry R. Davis is secretary.

The State Board of Control, Austin, Tex., will take bids until Feb. 19 for equipment for the State Highway Department, including crawler-type tractors, ten 110-gal. asphalt heaters, steel gravity dump and cargo body, and other apparatus as per specifications on file. R. B. Walthall, purchasing division, is in charge.

The Hughes Tool Co., Houston, Tex., has awarded a general contract to the Houston Structural Steel Co. for a one-story addition to its plant on Harrisburg Boulevard, 80 x 120 ft., estimated to cost \$80,000 with equipment. H. W. Fletcher is company engineer.

The Magnolia Petroleum Co., Dallas, Tex., has tentative plans for an addition to its oil refinery at Hodge Station, Tex., estimated to cost \$500,000 with machinery.

The Trout Lumber Co., Camp Hill, Ala., is in the market for a 75 hp. engine, 100 hp. return tubular boiler and auxiliary equipment for a power house.

The plant and property of the National Basic Fertilizer Co., Paint Rock, Ala., has been acquired by new interests. Plans are under way for a reorganization of the company, extensions and the installation of additional equipment.

The Beacon Hill Ice Co., 212 Garza Street, San Antonio, Tex., L. L. Stephenson, general manager, has plans for a new

ice-manufacturing and refrigerating plant at Woodlawn Avenue and Fredericksburg Road, 80 x 100 ft., estimated to cost \$100,000 with machinery.

The Missouri-Kansas-Texas Railroad Co., Railway Exchange Building, St. Louis, has plans for a one-story car repair shop at its Denison, Tex., works, estimated to cost \$175,000 with equipment.

The East Texas Utilities Co., Marshall, Tex., has acquired the electric light and power, and ice-manufacturing plant at Mount Vernon, Tex. Plans are under way for extensions and the installation of additional machinery.

The Gulf Coast Power Co., Corpus Christi, Tex., has plans for the installation of an additional unit at its steam-operated electric power plant, to increase the capacity about 1500 hp. with auxiliary equipment.

The Atlantic Coast Line Railway Co., Wilmington, N. C., has awarded a general contract to Huggar Brothers Construction Co., Bell Building, Montgomery, Ala., for new car and locomotive shops at Montgomery, estimated to cost \$450,000 with equipment. The works will replace the plant recently destroyed by fire.

The Peninsular State Oil Co., Jacksonville, Fla., has preliminary plans for a new storage and distributing plant to cost \$60,000 with equipment. P. H. Harrison is vice-president.

The post quartermaster, Fort Sam Houston, Tex., will receive bids until Feb. 15 for 50 rolls of galvanized screen wire, 36 in., 14-mesh.

The American Box Factory, Leesburg, Va., with branch plant at Memphis, Tenn., is considering tentative plans for a new factory at Jackson, Miss., for the production of reinforced boxes for crating automobiles for export, estimated to cost approximately \$60,000 including equipment.

The Texas Laundry Machinery Co., San Antonio, Tex., has preliminary plans for enlargements to cost about \$40,000 with equipment.

The Alabama School of Trades and Industry, Mobile, Ala., will install complete woodworking, printing, machine shop and other vocational equipment in a new trade school to be established, possibly at Ragland, St. Clair County, Ala.

The Woodward Iron Co., Woodward, Ala., is in the market for a jaw crusher, about 30 x 42 in.

F. W. Vance, city manager, Panhandle, Tex., is in the market for an ice-making plant of 10 to 20-ton capacity.

The Common Council, Sanford, Fla., is arranging for a bond issue of \$310,000, recently voted, the proceeds to be used for the installation of a municipal electric light and power plant. Electric-operated pumping machinery will also be installed at the proposed waterworks, for which bonds for \$375,000 in addition have been approved.

## South Atlantic States

BALTIMORE, FEB. 4.

PLANS have been filed by the Eastwick Motor Co., Baltimore, for a two-story automobile service and repair building, 150 x 165 ft., to cost \$125,000, with equipment.

The Youghiogheny Hydro-Electric Co., Baltimore, recently organized by William D. Macmillan and Joseph T. Brennan, Equitable Building, with capital of \$13,000,000, will operate as a subsidiary of the Youghiogheny Power Co., for the development of hydroelectric power in the Youghiogheny River section, Garrett County. The parent organization has commenced the construction of a power dam on Deep Creek for the installation of an electric generating plant to cost \$10,000,000, with machinery and transmission system.

D. C. Elphinstone, 408 Continental Building, Baltimore, machinery dealer, has inquiries out for two steam shovels, Bucyrus or Marion types; two well-drilling machines; one air compressor, about 350 cu. ft. capacity; two 30 to 50 ton saddle-tank locomotives, standard gage; two 18-ton saddle-tank locomotives, 36-in gage; about 20 4-yd. two-way dump cars, 36-in. gage; and ten 12 to 20-yd. capacity standard gage dump cars.

The Reliable Furniture Mfg. Co., 303 President Street, Baltimore, will take bids in about a month for a new two-story plant 260 x 275 ft., to cost \$100,000, with machinery.

The general purchasing officer, Panama Canal, Washington, will receive bids until Feb. 14 for a quantity of drill chucks, end mills, brass tubing, hacksaw blades, sheathing nails, steam traps, welding goggles, governors and similar equipment, circular 2345; until Feb. 9 for 1500 lb. steel nails; 26 tackle blocks; 4 chain blocks; 400 lb. common

wire nails; 200 lb. bronze rods; 12 circular saws; 10 snatch blocks and kindred equipment, circular 2344.

The White Water Wheel Co., Frederick, Md., has tentative plans for a new plant to manufacture water wheels of new type and parts. D. G. White is head.

The Bureau of Foreign and Domestic Commerce, Washington, has information regarding a recently organized company in South China, which plans for the construction of a brick and tile manufacturing plant, with power house, designed for an initial output of 80,000 pieces per day, reference No. 118018; also, of a company at Haute-Savoie, France, in the market for machinery to manufacture aluminum thimbles and kindred specialties, No. 8977; a company at Adelaide, Australia, desirous of purchasing machinery for the manufacture of wire and wire nails, No. 8978; a concern at Barcelona, Spain, in the market for washing and grinding machinery for barites, No. 8979; a company at Paris, France, inquiring for machine tools, No. 8975; a concern at Chihuahua, Mex., in the market for machinery to manufacture lead pencils, including cutting of cylinders, etc., No. 8972.

The Board of Trustees, Johns Hopkins University, Baltimore, has awarded a general contract to the Consolidated Engineering Co., Calvert Building, for the erection of a power plant on Wolf Street, to cost \$750,000 with equipment. The station will replace an existing power house on Monument Street.

Corley Brothers, Lexington, S. C., E. J. and J. R. Corley, heads, recently organized, have plans for a lumber mill and power house at Cayce, S. C., estimated to cost \$85,000 including equipment. G. A. Cralle will be in charge of erection.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until Feb. 19, for 3100 lb. of seamless copper tubing for the Puget Sound Navy Yard, Wash., schedule 1839; until Feb. 26 for 1076 lb. corrosion-resisting bar steel for the Mare Island, Cal., yard, schedule 1854.

H. W. Hargis, Jr., care of the Hargis Realty Co., 14½ South Church Street, Charlotte, N. C., is desirous of getting in touch with manufacturers of sugar refinery machinery.

The White Furniture Co., Mebane, N. C., has awarded a general contract to J. L. Crouse, Greensboro, N. C., for a new three-story plant, to replace its factory destroyed by fire recently, with loss of \$100,000. It will include a machine department 100 x 200 ft., with cabinet and finishing works, 80 x 250 ft., and will cost \$125,000. All machinery will be electrically operated, with individual motor drive. W. E. White is president.

The Modern Bond Corporation, West Fifth Street, Wilmington, Del., manufacturer of special machinery, metallic tubing, etc., has purchased property on the Lincoln Highway, Elsmere, for a new plant, estimated to cost \$200,000 with equipment. The initial unit will be one-story, 60 x 300 ft., and devoted exclusively to collapsible tubing manufacture. Other structures will be erected later.

The Virginia Railway & Power Co., Richmond, Va., is arranging a fund of \$1,300,000 for extensions during the year, of which amount about one-half will be expended in the Richmond-Petersburg district, and the remainder for plants and system in the Norfolk-Portsmouth territory.

The Wilmington & Philadelphia Traction Co., Wilmington, Del., will commence the erection of a one-story addition to its Brandywine steam-operated power plant, foot of Buena Vista Street, to cost approximately \$50,000.

J. R. Bond, 322 Broadway, Macon, Ga., is in the market for an air compressor outfit, complete, in good condition.

The Common Council, Florence, S. C., plans the installation of an electrically operated pumping plant on Black Creek, in connection with a proposed waterworks system estimated to cost \$250,000.

The Bureau of Yards and Docks, Navy Department, Washington, will receive bids until Feb. 13 for high frequency induction furnaces and converting equipment, for installation at the naval experiment and research laboratory, Bellevue, D. C., specification No. 1943.

The Russell S. Myers Co., Inc., Richmond, Va., general contractor, has inquiries out for an upright boiler, double drum; and air compressor with capacity 115 cu. ft. per min.

The Annapolis & Chesapeake Bay Power Co., Annapolis, Md., is disposing of a bond issue of \$800,000, a portion of the proceeds to be used for extensions and improvements. George T. Bishop is president.

The Department of Public Utilities, Danville, Va., has tentative plans for an addition to the municipal electric light and power plant, with turbo-generator, condenser and auxiliary equipment, estimated to cost \$125,000. Frank Talbot is superintendent.

## Canada

TORONTO, Feb. 4.

**D**EMAND for machine tools continues and local dealers and builders report several good purchases of equipment the past few days. Industrial interests are giving more attention to their plant equipment and showing a preference for labor and time saving machinery. The automotive industry is furnishing a large volume of present business and companies with electrical development projects underway are also good buyers of equipment.

A. T. Croft, Nova Scotia Power Commission, Halifax, N. S., will receive bids until Feb 12, for hydraulic equipment, including two water wheels of 3. h.p. each for installation at the Ruth Falls Power Development.

The Nova Scotia Power Commission, Halifax, N. S., is having plans prepared for the construction of a generator building at Sheet Harbor. K. H. Smith, Hollis Street, Halifax, is engineer.

R. N. Taylor & Co., 522 St. Catherine Street West, Montreal, are receiving prices on equipment for the manufacture of optical goods and electrical instruments.

The roundhouse of the Canadian Pacific Railway, Schreiber, Ont., and 16 locomotives were destroyed by fire with a loss of \$200,000.

The Canadian plant of the United States Light & Heat Co., Park Street, Niagara Falls, Ont., was destroyed by fire Jan. 26 with loss of \$100,000.

The Toronto Hardware Mfg. Co., 402 Dufferin Street, Toronto, is having plans prepared by Arnold McMaster & Co., 527 Confederation Life Building, Toronto, for an addition to cost \$50,000.

Berry Brothers, 211 Lieb Street, Detroit, Mich., con-

template an addition to their plant on Walker Road, Walkerville, Ont., to cost \$40,000.

Barnett McQueen Co., Ltd., Port Arthur, Ont., has received the general contract for the erection of an elevator at Port Arthur for the Reliance Terminal Elevator Co., Winnipeg, Man., to cost \$1,600,000. Subtrades will be let.

S. Svenningsson, Shawinigan Engineering Co., Ltd., Montreal, is preparing plans for a hydroelectric power house and mills on River Batiscan, to develop 5000 h.p., at a cost of \$250,000 for the North Shore Power Co., Ltd., Three Rivers, Que. J. S. Smith, Power Building, Montreal, is engineer.

Foundations are going in for a new plant for the Horton Steel Works, Ltd., Bridgeburg, Ont., to replace the plant recently destroyed by fire. A building, 66 x 260 ft., will be erected. The company is rehabilitating machines that were not completely destroyed, under the direction of E. G. Daniels, mechanical engineer of the company. C. H. Scheman, general manager, states no change is contemplated in the products handled by the company. Plate metal work will remain the principal business and it will specialize in the construction of elevated steel tanks for municipal and fire protection service, oil storage tanks, steel pipe, digestors, barking drums, mining tanks, etc.

## Western Canada

H. H. Carruthers, 636 Tegler Building, Edmonton, Alta., will build a sawmill at McBride, B. C., to cost \$45,000.

The Winnipeg Brick & Fuel Co., Osborn Street and Mulvey Avenue, Winnipeg, is in the market for equipment.

C. J. Brown, city clerk, Winnipeg, is receiving bids for a quantity of single phase, pole type transformers, with hangers, but without oil or cutouts for the hydroelectric system.

The Independent Tar & Asphalt Co., Vancouver, B. C., incorporated to manufacture building papers, prepared roofings, etc., has awarded the contract to Harrison & Lamond, 501 Pacific Building, Vancouver, for a plant on Granville Island.

## STEEL AND INDUSTRIAL STOCKS

The range of prices on active steel and industrial stocks from Monday of last week to Monday of this week was as follows:

	Low	High		Low	High
Allis-Chalmers ..	47 1/4	49 5/8	Int. Har. ....	84 1/2	86
Allis-Chal. pf. ....	94	95 3/4	Int. Har. pf. ....	106 3/4	108
Am. B. S. & Fdy. ....	80 1/2	81 3/4	Jones & L'lin pf. ....	109 1/2	110
Am. Can. ....	111 1/4	122 3/8	Lima Loco. ....	66 1/4	67 3/8
Am. Can pf. ....	111 1/4	112	Midvale Steel ...	31 1/2	33
Am. Car & Fdy. ....	170	176	Nat.-Acme ....	9 1/2	10 3/8
Am. C. & F. pf. ....	120	121	Nat. En. & Stm. ....	42	44
Am. Locomotive. ....	73 1/4	74 3/4	N. Y. Air Brake ....	41 1/2	42 3/4
Am. Loco. pf. ....	119	119 1/2	Otis Steel ....	10 1/2	11 3/4
Am. Radiator ....	102	104 3/4	Otis Steel pf. ....	63	63 1/2
Am. Radiator pf. ....	123 1/2	123 1/2	Pressed Stl. Car. ....	59	61 1/2
Am. Steel Fdries. ....	37 3/4	39	Pressed Stl. pf. ....	89 3/4	89 3/4
Am. Stl. Fd. pf. ....	103	104 1/4	Replogie Steel ...	13	15 3/8
Bald. Loco. ....	122 1/4	126	Republic ....	55 1/2	58 3/4
Bald. Loco. pf. ....	114 3/4	116	Republic pf. ....	91 1/2	92
Beth. Steel ....	67 1/2	61 3/4	Sloss-Sheffield ...	60	63 1/4
Beth. Stl. 7% pf. ....	92 1/2	95 1/2	Sloss-Shef. pf. ....	85 1/2	86 1/2
Beth. Stl. 8% pf. ....	107	109	Steel of Canada..	77 3/4	79 1/4
Br. Em. Steel. ....	4 1/4	4 1/4	Superior Steel ...	33 1/2	33 3/4
Br. Em. Stl. 2 pf. ....	13 1/4	13 1/4	Transue-Wms. ....	34	34 1/2
Chic. Pneu. Tool ....	83	83 3/4	Un. Alloy Steel. ....	33	34
Colo. Fuel ....	27 1/4	29 1/4	U. S. Pipe. ....	68 1/4	74 3/4
Crucible Steel ...	65 3/4	70 1/4	U. S. Pipe pf. ....	86 1/4	86 3/4
Crucible Stl. pf. ....	90	90	U. S. Steel. ....	103	107 1/4
Deere pf. ....	73	73	U. S. Steel pf. ....	118 3/4	120 1/4
Gen. Electric ....	210	218 3/4	Vanadium Steel. ....	30 1/4	31 3/4
Gt. No. Ore Cert. ....	29 1/4	30 3/4	Whouse Air Br. ....	92	96 3/4
Gulf States Steel ....	82 1/4	87	Y'gstown S. & T. ....	68 1/2	69

## Industrial Finance

The Lukens Steel Co., incorporated under Pennsylvania laws, has filed a financial statement with the Massachusetts commissioner of corporations dated Oct. 31, 1923, which shows total assets of \$31,042,581. Inventory is placed at \$3,403,234, cash debts receivable at \$2,051,484, and investments at \$2,320,556. The company's capitalization is \$15,898,800 and its funded debt \$5,212,300. It owes on notes and accounts \$1,579,842 and reserves are \$5,662,098.

Gross sales of the Canadian Car & Foundry Co. for the year ended Sept. 30, last, amounted to \$20,680,000, against \$9,487,000 in 1922. During the period reviewed 1700 freight cars were sold.

The Savage Arms Corporation reports earnings after taxes for 1923 in excess of \$400,000 as compared with a deficit in 1922 of \$168,165. Since the beginning of last year the company has shown marked improvement in earning power. Gross business in 1923 was about \$3,000,000, against \$639,526 in 1922. The Stevens Arms plant at Chicopee

Falls, Mass., specializing in small arms, is working at capacity.

Bankers will shortly offer for public subscription a block of common stock of the Ludlum Steel Co., Watervliet, N. Y. The company's earnings in 1923, with one month estimated, totalled \$487,000, whereas in 1922 they were \$256,264.

Judge Charles F. Lynch of the United States Court of New Jersey has appointed Edward Maxson, New Jersey State Commissioner of Banking and Insurance, operating receiver of the International High-Speed Steel Co., a New York corporation, with plant at Rockaway, N. J. Appointment was made on the petition of William G. Fisher, president of the company, principal stockholder, and also largest individual creditor, who alleged that dissension in the company promoted by the minority stockholders and a majority of the directors, had made the action necessary to conserve the rights of the creditors. Assets are largely in excess of its liabilities and steps have already been taken for its reorganization.

The Kruecke Brothers Mfg. Co., 515-517 Park Street, Milwaukee, brass founder and finisher, has filed a voluntary petition in bankruptcy. Schedules disclose liabilities of \$57,617 and claim assets of \$42,411. Unsecured claims amount to \$30,242. The first meeting of creditors has been called for Jan. 25.

W. T. Durbin, receiver for the Anderson Foundry & Machine Co., Anderson, Ind., a subsidiary of R. L. Dollings Co., now in the hands of the court, has filed a report showing that the concern has operated at a profit since he assumed charge July 16.

Sale of the assets of the Weldely Motors Co., Indianapolis, now in receivership, to Jesse B. Fields, of Bloomington, representing Edward W. Showers, president of the Showers' Brothers Furniture Co., that city, and W. A. Umphrey, Indianapolis, treasurer and general manager of the Weldely concern, has been approved by Judge Harry O. Chamberlin, of the Marion County circuit court. The purchase price was \$213,500. This represented \$130,000 for the real estate and machinery and \$83,500 for supplies, merchandise, work in process and work completed. It is understood that the concern will continue to manufacture motors.

The Norton Co., Worcester, Mass., manufacturer of abrasives and grinding machinery, through banking interests is retiring a substantial block of its 7 per cent cumulative preferred stock.

Deere & Co. reports net income of \$1,789,209 for the year ended Oct. 31, 1923, after taxes, depreciation and charges. This compares with a deficit of \$2,520,779 in the previous year. Total surplus is shown at \$8,940,617 against \$8,201,408 in 1922.

# Current Metal Prices

On Small Lots, Delivered from Merchant's Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of items the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-Ferrous Metals."

## Bars, Shapes and Plates

Bars:	Per Lb.
Refined iron bars, base price.....	3.54c.
Swedish charcoal iron bars, base.....	7.00c. to 7.25c.
Soft steel bars, base price.....	3.54c.
Hoops, base price.....	5.19c.
Bands, base price.....	4.39c.
Beams and channels, angles and tees, 3 in. x ¼ in. and larger base.....	3.64c.
Channels, angles and tees under 3 in. x ¼ in., base.....	3.54c.
Steel plates, ¼ in. and heavier.....	3.64c.

## Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger.....	3.60c.
(Smooth finish, 1 to 2½ x ¼ in. and larger).....	4.10c.
Toe-calk, ½ x ¾ in. and larger.....	4.60c.
Cold-rolled strip, soft and quarter hard.....	7.50c. to 8.50c.
Open-hearth, spring steel.....	4.50c. to 7.50c.
Shafting and Screw Stock:	
Rounds.....	4.40c.
Squares, flats and hex.....	4.90c.
Standard tool steel, base price.....	15.00c.
Extra tool steel.....	18.00c.
Special tool steel.....	23.00c.
High-speed steel, 18 per cent tungsten.....	75c. to 80c.

## Sheets

Blue Annealed	Per Lb.
No. 10.....	4.34c.
No. 12.....	4.39c.
No. 14.....	4.44c.
No. 16.....	4.54c.

## Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20.....	4.40c. to 4.45c.	.....
Nos. 22 and 24.....	4.45c. to 4.60c.	5.10c.
No. 26.....	4.50c. to 4.65c.	5.15c.
No. 28*.....	4.60c. to 4.75c.	5.25c.
No. 30.....	4.80c. to 4.95c.	.....

## Galvanized

	Per Lb.
No. 14.....	4.70c. to 4.85c.
No. 16.....	4.85c. to 5.00c.
Nos. 18 and 20.....	5.00c. to 5.15c.
Nos. 22 and 24.....	5.15c. to 5.30c.
No. 26.....	5.30c. to 5.45c.
No. 28*.....	5.60c. to 5.75c.
No. 30.....	6.05c. to 6.20c.

\*No. 28 and lighter, 36 in. wide, 20c. higher.

## Welded Pipe

Standard Steel	Black	Galv.	Wrought Iron	Black	Galv.
½ in. Butt...	—41	—24	½ in. Butt...	—4	+19
¾ in. Butt...	—46	—32	¾ in. Butt...	—11	+9
1-3 in. Butt...	—48	—34	1-1½ in. Butt...	—11	+6
2½-6 in. Lap...	—44	—30	2 in. Lap...	—5	+14
7-8 in. Lap...	—41	—11	2½-6 in. Lap...	—9	+9
9-12 in. Lap...	—34	—6	7-12 in. Lap...	—3	+16

## Bolts and Screws

Machine bolts, cut thread, 45 and 10 to 50 and 10 per cent off list	
Carriage bolts, cut thread, 35 to 35 and 10 per cent off list	
Coach screws.....	45 to 50 and 10 per cent off list
Wood screws, flat head iron, 75, 20, 10 and 7½ per cent off list	

## Steel Wire

	Per Lb.
Bright basic.....	4.75c. to 5.00c.
Annealed soft.....	4.75c. to 5.00c.
Galvanized annealed.....	5.40c. to 5.65c.
Coppered basic.....	5.40c. to 5.65c.
Tinned soft Bessemer.....	6.40c. to 6.65c.

\*Regular extras for lighter gage.

## Brass Sheet, Rod, Tube and Wire

### BASE PRICE

High brass sheet.....	17¼c. to 18¼c.
High brass wire.....	17¼c. to 18¼c.
Brass rods.....	15 c. to 16 c.
Brass tube, brazed.....	25¼c. to 26¼c.
Brass tube, seamless.....	21¼c. to 22¼c.
Copper tube, seamless.....	22¼c. to 23¼c.

## Copper Sheets

Sheet copper, hot rolled, 20 to 20½c. per lb. base.  
Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

## Tin Plates

Bright Tin	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	Coke—14 x 20	Prime	Seconds
			80 lb..	\$6.55	\$6.30
			90 lb..	6.65	6.40
			100 lb..	6.75	6.50
IC..	\$12.55	\$10.70	IC..	7.00	6.75
IX..	13.95	12.55	IX..	8.25	8.00
IXX..	15.55	13.75	IXX..	9.50	9.25
IXXX..	17.10	15.30	IXXX..	10.75	10.50
IXXXX..	18.85	16.80	IXXXX..	12.00	10.75

## Terne Plates

8 lb. coating, 14 x 20

100 lb. ....	\$7.00 to \$8.00
IC .....	7.25 to 8.25
IX .....	8.25 to 8.75
Fire door stock.....	9.00 to 10.00

## Tin

Straits pig .....	52c.
Bar .....	60c. to 62c.

## Copper

Lake ingot .....	15¼c.
Electrolytic .....	15 c.
Casting .....	14 c.

## Spelter and Sheet Zinc

Western spelter .....	7¼c.
Sheet zinc, No. 9 base, casks.....	10¼c. open 11¼c.

## Lead and Solder\*

American pig lead .....	9½c. to 9¼c.
Bar lead .....	12c. to 13c.
Solder ½ and ½ guaranteed .....	35¼c.
No. 1 solder .....	33¼c.
Refined solder .....	29¼c.

\*Prices of solder indicated by private brand vary according to composition.

## Babbitt Metal

Best grade, per lb.....	75c. to 90c.
Commercial grade, per lb.....	35c. to 50c.
Grade D, per lb.....	25c. to 35c.

## Antimony

Asiatic .....	12¼c. to 13c.
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## Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.....	36c.
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## Old Metals

Red and yellow metals are quiet but lead and aluminum are active. Dealers' buying prices are as follows:

	Cents Per Lb.
Copper, heavy crucible.....	11.00
Copper, heavy wire.....	10.50
Copper, light bottoms.....	9.00
Brass, heavy .....	6.00
Brass, light .....	4.75
Heavy machine composition.....	8.75
No. 1 yellow brass turnings.....	6.00
No. 1 red brass or composition turnings.....	7.75
Lead, heavy .....	7.25
Lead, tea .....	5.75
Zinc .....	4.00
Cast aluminum .....	17.00
Sheet aluminum .....	17.00